The OIL WEEKLY

15c

OIL and GAS ENGINEERING

FOR OIL AND GAS PRODUCTION AND PIPE LINE DIVISIONS

THE WEEK'S NEWS INTERPRETED

MAY 28, 1934

me 73 Number 11

ALL NATURE'S FORCES
CANNOT BE CONTROLLED
but
YOU CAN DEPEND ON
HUGHES VALVES
AND
HUGHES (BROWN) SAFETY TUBING HEAD
TO SAFELY CONTROL YOUR HIGH PRESSURE GAS AND OIL WELLS
MEMBER AMERICAN PETROLEUM EQUIPMENT SUPPLIERS ASSOCIATION
HUGHES TOOL COMPANY
Service Plants: LOS ANGELES, CALIF.
Main Office and Plant: HOUSTON
Export Office: 30 RECTOR STREET

Save MOTOR-HOUSE EXPENSE

Pump Your Wells With G-E Motors and Control Installed Outdoors

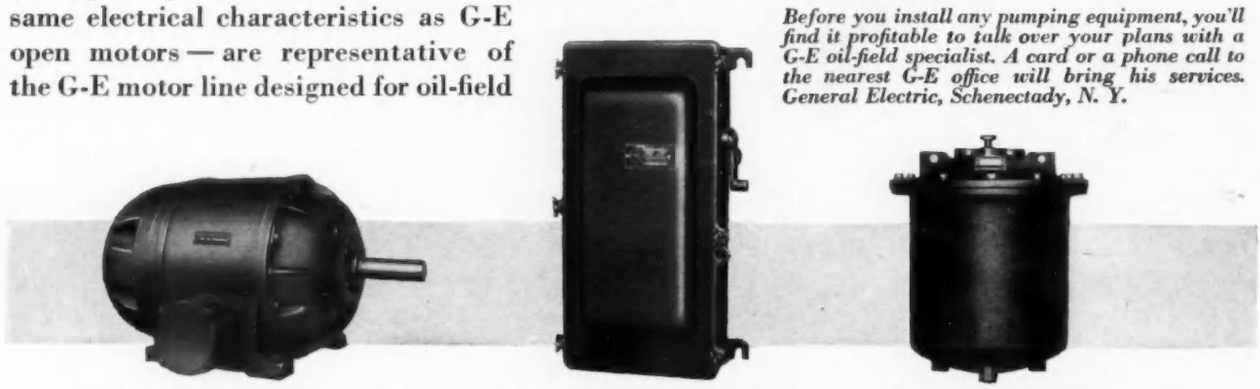
Lufkin oil-well pumping rig driven by G-E splash-proof motor. Typical of outdoor installations in East Texas

G-E splash-proof motors are constructed to prevent the entrance of any liquids or solid particles which fall on them, or approach them, in a straight line at an angle not exceeding 100 degrees from the vertical. This is one of the many reasons why they are admirably suited for installation outdoors.

Matching these dependable drives in quality and utility, General Electric also has available a line of outdoor control. Thus, it is possible not only for us to help you solve your particular well-pumping-drive problem — with the RIGHT MOTOR and the RIGHT CONTROL — but also to enable you to avoid the expense of building a motor house.

G-E splash-proof motors—available with the same electrical characteristics as G-E open motors — are representative of the G-E motor line designed for oil-field service. This line includes gear-motors — available with splash-proof protection — for slow-motion pumping, and explosion-proof motors for locations where inflammable gas is present. All of these drives can be obtained in double- or triple-horsepower ratings, for present and future needs.

Before you install any pumping equipment, you'll find it profitable to talk over your plans with a G-E oil-field specialist. A card or a phone call to the nearest G-E office will bring his services. General Electric, Schenectady, N. Y.



G-E explosion-proof motor for Class I, Group D, hazardous gas locations

G-E waterproof combination magnetic switch—a line switch and a magnetic starter all under one cover in a cast-iron case

G-E explosion-proof, oil-immersed magnetic starter

020-18

GENERAL ELECTRIC

The OIL WEEKLY. Issued weekly by the Gulf Publishing Co., 3301 Buffalo Drive, Houston, Texas. Subscription price $1.00 per year; 15 cents per copy. Entered as second-class mail matter December 23, 1916, at the post office at Houston, Texas, under act of March 3, 1879.

THE OIL WEEKLY

VOLUME 73, No. 11
MAY 28, 1934

COPYRIGHT, 1934

Published Weekly by
THE GULF PUBLISHING COMPANY
HOUSTON, TEXAS

S. W. ROBINSON
Editor

W. L. BAKER
Associate Editor

CONTENTS

Special Features

Code Case and Oil Bill in Limelight 6
Jack Logan

Value of Institute Work Reviewed; Directors Silent on Control Bill 8
Spencer W. Robinson

Production Program Deals Largely With Problems of Eastern Area 9
Warren L. Baker

President's Approval of Ickes Oil Control Bill Does Not Stop Fight 12

Federal Allocation Increased 162,100 Barrels for June 12

U. S. Circuit Court Hearing in Texas Suit Upholds Oil Code Power 14

Acid Treatment of Michigan Oil Wells 17
K. A. Covell

Care and Operation of Small Gas Wells East of the Mississippi River 23
J. H. Newlon

Care and Operation of Small Oil Wells East of the Mississippi 29
Herman J. Little

Properties of Nickel-Alloy Cast Irons and Their Special Applications in Petroleum Production Equipment 32
O. B. J. Fraser and J. S. Vanick

The Well Spacing Problem—Low Well Density Increases Ultimate Recovery 43
John R. Suman

Control Bill Condemned by Fouts at Hearing As Unconstitutional 53

Regular Departments

Advertisers' Index 82
The Changing Panorama 5
Men in the Industry's News 11
Markets-Production-Crude Prices 47
United States Production Estimates 47
Crude Oil Price Quotations 51
California Fields 80
Oklahoma Fields 58
Kansas Fields 59
East Texas 60
North and West Texas 61
South Texas 63
Gulf Coast Fields 64
Louisiana Fields 67
Arkansas Fields 69
Southeastern States 69
Rocky Mountain States 71
Michigan Fields 74
Eastern States Fields 75
Drilling Reports on Important Wildcats 76
Squeaks from the Bull Wheel 81

SPECIALIZED OIL JOURNALS

Published by

THE GULF PUBLISHING COMPANY

R. L. DUDLEY, *President*
A. L. BURNS, *Gen'l Manager*
S. W. ROBINSON, *Editorial Director*
J. KENT RIDLEY, *Managing Editor*

NEW YORK: Room 323, 250 Park Avenue, Dick Swinsky, Manager.

PITTSBURGH: 902 Standard Life Building, W. W. Pigue, Manager.

CHICAGO: Room 1235, 141 W. Jackson Blvd., Tom W. Nelson, Manager.

LOS ANGELES: 416 Haas Building, W. E. Green, Manager.

TULSA: 1020-23 Hunt Building, J. F. Carter, Jr., Manager.

FORT WORTH: 203 W. T. Waggoner Building, H. H. King, Manager.

Issued Monday of each week. Single copies 15 cents. Subscription price: Domestic $1.00 a year, Foreign $1.00 a year. Entered as second-class mail matter December 23, 1916, at the post office at Houston, Texas, under act of March 3, 1879. Subscription restricted to those engaged in the producing and pipe line branches of the oil business or the manufacture and distribution of oil field supplies. Advertising rates on application.

JUST WHAT OIL MEN THEMSELVES ASKED FOR

Success of any product depends upon giving the other fellow what he needs. That is why we produce 'Incor' 24-Hour Cement with the oil man's requirements in mind.

Trained experts are sent into the field; they talk to oil men, study operating problems. They come back and report, "Oil men want a cement that mixes quickly!" "Workability!" say our research chemists—and they have produced, in 'Incor', a cement having unusually high workability which thickens quickly when it ceases to flow.

"They want a cement that will support the casing—and do it now!" say our field men. "High-early-strength!" say our chemists. Result—in 'Incor' you get exceptionally high early strength.

"They want," say our field men, "a cement to hold water out, gas and oil in!" "Density!" say our chemists, "we have developed a manufacturing process which gives 'Incor' its amazing ability to combine with water into a dense, jelly-like mixture."

The price is only a little more than ordinary Portland cement—a fraction of resulting economies. 'Incor' is made by the producers of Lone Star Cement, subsidiaries of International Cement Corporation, New York, and is sold by other leading cement manufacturers. Dealers everywhere have a fresh supply of 'Incor'* in stock for quick delivery.

* Reg. U. S. Pat. Off.

'INCOR' 24-Hour Cement

MAY 29 1934
©CIB 226508

VOLUME 73, No. 11 MAY 28, 1934

THE OIL WEEKLY

FOR OIL AND GAS PRODUCTION AND
PIPE LINE DIVISIONS

ENGINEERING • NEWS • STATISTICS

The Changing Panorama

"Consistency, Thou Art a Jewel"

While Mr. Ickes is telling the President, Congress and the world at large in what straits the oil industry is because of too much oil, his other hand is authorizing an increase in production "to meet the usual increased seasonal demand."

Revised figures on "legally" produced oil for the four weeks ending April 19, the latest compiled by the American Petroleum Institute, show a daily average of 2,479,200 barrels. This is an excess of 113,000 barrels as compared to the present federal allowable. Additional excess, variously estimated, is the "hot" oil production, believed to approximate 60,000 barrels per day. Both excesses together amount to 173,000 barrels above currently "allowed" output.

Effective June 1, "allowed" production is increased 162,100 barrels to 2,528,300 barrels, or 10,900 barrels below the present production from all sources.

During the four-week period previously named, indicated runs to stills averaged 2,442,000. It is assumed that "hot" oil not reporting produced also is not reported as refined, so indicated demand is above "allowed" production and some 30,000 barrels below "reported" production.

There is complaint that refiners are running too much crude and making too much gasoline.

But in spite of the fact that according to the figures, an excess of actual production above calculated needs has been piling up for more than a month at the rate of 173,000 barrels daily, a prospective good month for the business justifies an increase of 162,100 barrels daily.

Perhaps our pencil is not sharp enough, but it would appear that if the world needs 4,863,000 barrels more "allowed" production in June, it could balance accounts with the 5,190,000 barrels produced above requirements during May.

In other words, if there already is too much oil, why open any valves?

Perhaps the answer is that a whole lot has been said about too much oil and about not enough oil, but nobody has ever seemed to bother about just how much is enough.

Continued brisk bidding for wells and leases in East Texas by major companies indicates they look for high crude prices in years just ahead. . . . Current high demand for oils, comparable with pre-depression levels, and obviously a factor in present favorable earnings, is not limited to the U. S. First quarter gasoline consumption in the United Kingdom was 13 percent higher in 1934 than in 1933. . . . Higher industrial production in 1933 than in 1932 in eight principal manufacturing countries is considered a reliable indication that world-wide economic improvement is under way.

The Oil Man's Calendar

JUNE
- 7-8 *Fire and Safety Marshals, N.P.A., Warren, Pennsylvania.*
- 14-15 *Pennsylvania Grade Crude Oil Association, State College, Pennsylvania.*
- 25-29 *American Society of Mechanical Engineers, Denver, Colorado.*

AUGUST
- 24-27 *Drake Well Memorial Celebration, Titusville, Pennsylvania.*

SEPTEMBER
- 10-14 *American Chemical Society, Cleveland, Ohio.*
- 19-21 *National Petroleum Association, Atlantic City, New Jersey.*

OCTOBER
- 29 *American Gas Association, Atlantic City, New Jersey.*

NOVEMBER
- 12-15 *American Petroleum Institute, Dallas, Texas.*
  American Association of Petroleum Geologists (Pacific Section), Los Angeles.

Code Case and Oil Bill in Limelight

New Orleans decision restores federal oil control through code, and serves as argument against Ickes bill. But insistence from White House promises victory for the measure. Markets show pronounced improvement, and tend to discount claims that present conditions threaten the industry's stability.

By JACK LOGAN

EVENTS and developments in oil during the past week were of more than ordinary significance. They represented an important extension of today's evolution (or revolution) in political economy as applied to the petroleum industry. They indicated that the industry is already under stronger federal government control than may have been realized, and that the industry is quite likely to enter shortly upon a path of even stricter and possibly permanent national government regulation.

Through a court decision at New Orleans it was assured that federal control will be a dominant force in the oil business at least until next fall and possibly until this time next year. And in consequence of developments at Washington in connection with the Ickes-fostered oil bill, the chances appeared high for even stronger and more permanent federal regulation.

Ickes in the Saddle

In consequence of the New Orleans decision, Secretary Ickes is back in the saddle, and he is free to ride herd on crude oil producers for the remaining one year's life of the NIRA, unless stopped next fall by the Supreme Court. This authority he has under the oil code, and it is his regardless of whether or not his "Federal Petroleum Act" passes in Congress.

Just when the secretary will begin cracking his whip will depend, apparently, upon how soon the fate of his congressional bill becomes known. He earnestly wants the bill passed, and is fighting for it, and hoping that he will be able to proceed shortly in regulating crude oil production under it. Under the circumstances, it would hardly be logical for him to stop in his fight for the legislation and divert his energies to any immediate determined drive on "hot" oil under his oil code authority. For restoration of the oil administration's powers through the court decision was quickly seized upon by opponents of the proposed new oil law as argument that it is not needed. And a successful campaign against "hot" oil immediately might serve only to substantiate such argument and help defeat the measure.

Thus it appears not unlikely that federal control may rock along without great change until the fate of the Ickes bill is determined; then become strict and aggressive. If the new law is passed, control efforts will proceed under it. If it is rejected, the regulatory activities will go forward under the code. But in any event, Secretary Ickes is in the saddle, and federal oil control is destined to become much more than just a phrase.

The New Orleans Decision

The important decision at New Orleans was that of the United States Fifth Circuit Court of Appeals May 21 upholding the validity of the NIRA oil code. Sanctioning federal regulation of crude production, the decision nullified injunction against federal agents granted by a federal district court last February to Panama Refining Company and other complainants operating in the East Texas field. The decision represents an important victory for the NIRA itself as well as for the oil administration, although another hurdle lies ahead. The case will be appealed to the United States Supreme Court, attorney for the complainants has indicated.

Another case, that of the United States versus J. W. Smith and others, has taken the lead, however, in carrying litigation over the NIRA oil code into the nation's highest court. Attorneys for both sides in the Smith case have been working at length on it, but it has been indicated a decision will not be forthcoming until the court sits next fall after a summer recess.

Because of having had its hands tied by the district court decision last February, the oil administration has not been attempting to police the East Texas field, scene of most of the nation's "hot" oil production, although it has kept agents at work assembling evidence against violators. A recent report indicated

there were around 50 of the "federals" in the district, and some have been at work in the Conroe field, it is said.

It is apparent thus that Secretary Ickes is in position to begin getting results in short order when the impending tightening of federal control gets under way under the code or the proposed new law.

Chances High for New Law

Prospects for passage of the oil control law by Congress were materially enhanced at the middle of the past week when President Roosevelt adopted an attitude of insistence in regard to it. He had previously approved the measure, but not until last week did he urge Congress to pass it before the impending adjournment, which is expected around June 15.

The bill began moving early last week when the Senate mines committee heard proponents and opponents and on May 25 informally reported favorably on it. The House commerce committee is due to take action on it around the middle of this week. Sponsors of the measure hope it will be among the nation's new laws when Congress goes home.

Stacks of telegrams and letters both for and against a new federal oil law reached the Senate subcommittee and gave evidence of the highly controversial nature of the proposed legislation.

While pressure from the White House for passage of the bill greatly increased its chances, that influence was partially counteracted by the New Orleans decision, as mentioned above. Also possibly jeopardizing the measure was the insistence in the Senate committee hearing by both Secretary Ickes and Chairman Beaty of the oil code planning and coordination committee that the law-makers delete the provision added by Congressman Disney in the House version of the bill, limiting life of the measure to two years. In fostering the bill, Secretary Ickes had intended it as a permanent proposition, and Disney wrote in the time limit without his approval.

There are many who are willing to embrace federal regulation in trial marriage, but who don't want to get hitched up in the regular way, fearing that no matter how much it might be desired in the future, a divorce could perhaps never be invoked to untie the solemn bonds. Their caution has been enhanced by the developments of the past week. Considering the Ickes and Beaty attitudes and the New Orleans decision, some of them have come to be in favor of throwing aside the whole idea of a new law, and of letting the now strengthened oil code take care of the "emergency" which is said to exist. (Some say it does, and some say it doesn't.)

Better Markets Do Not Indicate Emergency

In so far as the oil markets were concerned, claims of the present existence of a national emergency in oil were not borne out last week. Crude oil prices continued unchanged, of course, as they have done since inauguration of the code last fall. But gasoline prices rose sharply in the Mid-Continent and on the Pacific Coast, and showed strength throughout the country. When the industry is really entertaining fears of breakdown of crude production control the prices of gasoline do not rise. On the contrary, they go down.

The strength of the gasoline market last week was due to several influences. In large measure it was due to substantial purchases by integrated companies under the oil administration's request that such companies cooperate in removing excess or distress gasoline from the market. The improved outlook for crude production control in consequence of the New Orleans court's sanction of the oil code was another price stimulant. For the Pacific Coast a favorable market influence was furnished by the prospect of inauguration of a new marketing plan under the oil code administration.

The Price Increases

The long California gasoline price war ended during the week with posting of higher prices, and further increases were expected to follow if and when the new agreement is approved by the federal government and placed in effect.

Purchases by the big companies were largely responsible for sharp gains in East Texas refinery prices last week. The prices set records for the year, and were among the highest in the history of the big refining district. Third-grade gasoline, chief product of the area, had risen by the middle of last week to an average price of around 4⅛ cents a gallon. Through continuous improvement the price had risen one-half cent within a week. Middle and first grades meanwhile rose a quarter cent each, going to 4½ and 4¾ cents, respectively.

In the region centering around Oklahoma and Kansas, in the meantime, the three grades rose one-eighth cent each, the new Group Three prices being 4¼, 4¾ and 5 cents.

Because of the strength of the refinery prices, termination of retail price wars in North and South Texas metropolitan areas was expected momentarily. For several weeks the wars, concentrated mostly on third-grade, with majors meeting independents' prices, had kept prices depressed in those areas, with the bottom grade retailing at 11 cents a gallon, including 5 cents for taxes.

Although independents inaugurated the low prices, dropping from 16 to 14 to 12 to 11 cents, there were some among them last week who were charging that the majors were purposely prolonging the war, despite heavy losses, in order to inflate their gallonage to be used as bases in fixing quotas under the new refinery control section of the oil code, while at the same time holding independents down to low gallonage.

Progress In Drilling and Production

Value of Institute Work *Reviewed;* *Directors* Silent On Control Bill

SPENCER W. ROBINSON

PITTSBURGH, PENN., MAY 23.

ENACTMENT of the Disney bill, giving Secretary of the Interior Harold L. Ickes power to prevent waste of petroleum resources and to stabilize the petroleum industry in the interest of the nation, and the imposition of a general manufacturers' sales tax as a solution for the taxation problem, were advocated by Axtell J. Byles, president of the American Petroleum Institute, before the trade association's fourth mid-year meeting here today.

"The statements I make this afternoon in 'the presidents address,' represent my personal opinion on the subjects considered," said Mr. Byles. "They are not to be construed as reflecting or representing the expressed sentiments of the institute's board of directors on the proposed legislation for federal control of crude oil production. The board has taken no action on that matter."

"Delivering "the president's address" at the afternoon general session, Byles expressed the belief that while the Disney bill would vest great power in the Secretary of the Interior, "so long as this power remains in the hands of the present secretary, we have confidence that it will be administered fairly and intelligently both from the standpoint of the public and of the industry." He warned, however, that the consequences of maladministration at some future time were so serious that there is considerable sentiment for having the bill expire by limitation at the end of 1937. The period, he explained, is sufficiently long to demonstrate the fact if the measure is unsuccessful, and to permit the development of practically unanimous sentiment for its re-enactment if it proves successful.

State Competition

Pointing out that the Disney bill embodies principles approved at the institute's annual meeting last October, and is designed efficiently to coordinate control of the production of crude oil in order to balance it with consumer demand, Byles said experience has demonstrated that, regardless of good intentions, the states have displayed a natural desire to increase their respective shares of the national production of crude oil, thus merely transferring to states the previous competition between companies and individuals.

"There are understandable misgivings and apprehensions on the part of the industry toward placing in the hands of the federal government so great a power as that given by the control of raw material," he explained. "Inherent in this power is control over prices of both raw material and finished products. There is every confidence that the present secretary of the interior will exercise this power intelligently, fairly and courageously in what he conceives to be the interest of both industry and the public.

"The bitter experience of the past few years, resulting from failure to enforce equitable proration, has convinced a vast majority of the industry that such control is essential not only in the protection of the public interest, from the standpoint of conversation, but to prevent complete chaos and bankruptcy in the industry itself."

Notwithstanding vigorous efforts of the federal government, it has been impossible to balance crude oil production with consumer demand, Byles said, pointing out that in the first eight months of operation under the oil code federal allowables have been exceeded by approximately 9,500,000 barrels, exclusive of production of "hot" oil, estimated at 12,000,000 barrels.

Improvement in crude oil markets since adoption of the oil code has been gratifying, he declared, but less gratification is seen in the fact that the refining branch of the industry is not getting a realization for products which justified present crude oil prices.

"Dollar crude oil, with three and one half-cent gasoline," he explained, "causes pressure which the refinery cannot stand. And while hope is revived by the new Article 4 of the refining code, and the steps already taken thereunder, satisfactory results cannot be attained unless accompanied by more effective control of crude oil."

In the marketing branch of the industry, Byles said, "violation of the spirit and the letter of the code is rampant."

"It is hard, under these conditions, for an industry to be patient," he said. "The temptation, particularly in these times, is to seek one panacea after another, all of them are futile unless the evil is cured at its source. Most of them arise by reason of actual and potential overproduction of crude oil. When it becomes certain that a correction of this situation is in the process of being brought about, confidence will be restored and the price of gasoline once more bear a proper relationship to the cost of crude oil, through giving the refiner, both large and small, the protection which he needs and to which he is entitled."

Byles was inclined to blame taxation for many of the industry's troubles, particularly the difficulty of meeting in-

—Blank & Stoller

AXTEL J. BYLES
The President's address favored the Disney bill

Practice Reviewed At A. P. I. Meeting

creased costs, higher overhead, and larger marketing margins.

"We can, with approximate accuracy, divide a gasoline dollar three ways," he explained. "One third of it has to take care of land departments, discovery and production of crude oil, storage and transportation, and manufacturing costs; one third goes to the cost of marketing, and one third in taxes, federal, state and local.

"The trend today is decidedly toward an increase in the proportion absorbed by taxation and marketing costs. A continuance of these trends will as surely destroy the industry as was destroyed the legendary goose which laid the golden egg. The answer to the taxation problem is a general manufacturers sales tax, which has aptly been described as 'painless taxation.' An exceedingly modest tax, spread over all commodities, would relieve the purchaser of gasoline and the oil industry of a part of the unjust discriminatory and destructive burden. Neither the present tax burden nor the increase in cost of distribution is in the interest of the public any more than it is in the interest of the oil industry."

Speaking of the labor situation, Byles said the petroleum industry has been remarkably free from difficulties, with its wage scale well above the industrial average and hours and working conditions steadily improving throughout the

(*Continued on page 55*)

BAIRD H. MARKHAM
He wants more business representation in government

Production Program *Deals Largely With* Problems of Eastern Area

WARREN L. BAKER

PITTSBURGH, PENN., MAY 24.

DRILLING and producing practices and methods are undergoing a great change, due largely to advancements in petroleum engineering. Papers and discussions at the division of production sessions held during the Fourth Mid-Year Meeting of the American Petroleum Institute, further revealed that many new developments are to be anticipated in the near future.

Greater operating efficiency, lower costs, improved technique, new conceptions of producing practices and methods are being achieved as a result of increased engineering studies. Mid-Continent engineers stated drilling costs in that region were being lowered constantly, due solely to progress in technique. The chief benefits during the past year have been the development of a better understanding of under-ground conditions existing in oil reservoirs. With this knowledge as a basis, advancements in the future are expected more rapidly and to be more beneficial to oil operators. For example, it is now recognized that bottom-hole pressures, sand face thickness, porosity and saturation are factors that cannot be overlooked in the allocation of production on an equal withdrawal basis. Likewise, an economical and efficient well spacing program is imperative to the welfare of the industry, as is the conservation of reservoir pressures and the adoption of methods promoting greater returns to operators.

Another important disclosure of these sessions was the possibilities and importance of probable future deep development in the Eastern District. Deep drilling in this region is only in its infancy. These deeper buried sands are yielding gas production and since gas reserves in the region need to be enlarged to meet the demand, increased drilling may be anticipated. Production papers on Eastern practices further showed that only a small percentage of the recoverable oil has been extracted and that the territory will continue to be a profitable producer for many years.

Coming East for the first time with its mid-year meeting, the Division of Production of the American Petroleum Institute found considerable interest in the operating practices and future recovery trends of the oil fields of eastern United States, many of which will be applied later to other regions of the nation, and probably the world.

Surveys of Pennsylvania's eastern plateaus, from McKean County east to Susquehanna County, have revealed about 20 anticlines with approximately 35 domed areas that may be considered favorable sites for the accumulation of natural gas, S. H. Catchcart, Pennsylvania State Geological Survey, said in his paper "Deep Sand Developments in the Eastern Area," which opened the group session.

This area, embracing 12,000 square miles and with anticlines extending 1000 miles, includes the district of present interest in the Oriskany sands, with folds and faults as prominent features. The territory is believed to include three independent pools, with the probable area of the main pool between six and eight square miles. Not all the Northern Pennsylvania pleateau country can be considered equally as favorable for prospecting, the speaker said.

Recent Development

Development of the Oriskany sand, begun as recently as March, 1930, and in September and November of the same year the Tioga and Hebron fields were discovered. The Oriskany now is productive at two other localities.

Drilling of deep wells in the eastern fields to reach the Oriskany and other sands 4000 to 6000 feet deep was suggested by Frank E. Eckert, of Hanley & Bird, Bradford, Pennsylvania, as a means

Progress In Drilling and Production

Value of Institute Work *Reviewed; Directors* Silent On Control Bill

SPENCER W. ROBINSON

PITTSBURGH, PENN., MAY 23.

ENACTMENT of the Disney bill, giving Secretary of the Interior Harold L. Ickes power to prevent waste of petroleum resources and to stabilize the petroleum industry in the interest of the nation, and the imposition of a general manufacturers' sales tax as a solution for the taxation problem, were advocated by Axtell J. Byles, president of the American Petroleum Institute, before the trade association's fourth mid-year meeting here today.

"The statements I make this afternoon in 'the presidents address,' represent my personal opinion on the subjects considered," said Mr. Byles. "They are not to be construed as reflecting or representing the expressed sentiments of the institute's board of directors on the proposed legislation for federal control of crude oil production. The board has taken no action on that matter."

"Delivering "the president's address" at the afternoon general session, Byles expressed the belief that while the Disney bill would vest great power in the Secretary of the Interior, "so long as this power remains in the hands of the present secretary, we have confidence that it will be administered fairly and intelligently both from the standpoint of the public and of the industry." He warned, however, that the consequences of maladministration at some future time were so serious that there is considerable sentiment for having the bill expire by limitation at the end of 1937. The period, he explained, is sufficiently long to demonstrate the fact if the measure is unsuccessful, and to permit the development of practically unanimous sentiment for its re-enactment if it proves successful.

State Competition

Pointing out that the Disney bill embodies principles approved at the institute's annual meeting last October, and is designed efficiently to coordinate control of the production of crude oil in order to balance it with consumer demand, Byles said experience has demonstrated that, regardless of good intentions, the states have displayed a natural desire to increase their respective shares of the national production of crude oil, thus merely transferring to states the previous competition between companies and individuals.

"There are understandable misgivings and apprehensions on the part of the industry toward placing in the hands of the federal government so great a power as that given by the control of raw material," he explained. "Inherent in this power is control over prices of both raw material and finished products. There is every confidence that the present secretary of the interior will exercise this power intelligently, fairly and courageously in what he conceives to be the interest of both industry and the public.

"The bitter experience of the past few years, resulting from failure to enforce equitable proration, has convinced a vast majority of the industry that such control is essential not only in the protection of the public interest, from the standpoint of conversation, but to prevent complete chaos and bankruptcy in the industry itself."

Notwithstanding vigorous efforts of the federal government, it has been impossible to balance crude oil production with consumer demand, Byles said, pointing out that in the first eight months of operation under the oil code federal allowables have been exceeded by approximately 9,500,000 barrels, exclusive of production of "hot" oil, estimated at 12,000,000 barrels.

Improvement in crude oil markets since adoption of the oil code has been gratifying, he declared, but less gratification is seen in the fact that the refining branch of the industry is not getting a realization for products which justified present crude oil prices.

"Dollar crude oil, with three and one half-cent gasoline," he explained, "causes pressure which the refinery cannot stand. And while hope is revived by the new Article 4 of the refining code, and the steps already taken thereunder, satisfactory results cannot be attained unless accompanied by more effective control of crude oil."

In the marketing branch of the industry, Byles said, "violation of the spirit and the letter of the code is rampant."

"It is hard, under these conditions, for an industry to be patient," he said. "The temptation, particularly in these times, is to seek one panacea after another, all of them are futile unless the evil is cured at its source. Most of them arise by reason of actual and potential overproduction of crude oil. When it becomes certain that a correction of this situation is in the process of being brought about, confidence will be restored and the price of gasoline once more bear a proper relationship to the cost of crude oil, through giving the refiner, both large and small, the protection which he needs and to which he is entitled."

Byles was inclined to blame taxation for many of the industry's troubles, particularly the difficulty of meeting in-

—Blank & Stoller

AXTEL J. BYLES
The President's address favored the Disney bill

Practice Reviewed At A. P. I. Meeting

creased costs, higher overhead, and larger marketing margins.

"We can, with approximate accuracy, divide a gasoline dollar three ways," he explained. "One third of it has to take care of land departments, discovery and production of crude oil, storage and transportation, and manufacturing costs; one third goes to the cost of marketing, and one third in taxes, federal, state and local.

"The trend today is decidedly toward an increase in the proportion absorbed by taxation and marketing costs. A continuance of these trends will as surely destroy the industry as was destroyed the legendary goose which laid the golden egg. The answer to the taxation problem is a general manufacturers sales tax, which has aptly been described as 'painless taxation.' An exceedingly modest tax, spread over all commodities, would relieve the purchaser of gasoline and the oil industry of a part of the unjust discriminatory and destructive burden. Neither the present tax burden nor the increase in cost of distribution is in the interest of the public any more than it is in the interest of the oil industry."

Speaking of the labor situation, Byles said the petroleum industry has been remarkably free from difficulties, with its wage scale well above the industrial average and hours and working conditions steadily improving throughout the

(*Continued on page 55*)

BAIRD H. MARKHAM
He wants more business representation in government

Production Program *Deals Largely With* Problems of Eastern Area

WARREN L. BAKER

PITTSBURGH, PENN., MAY 24.

DRILLING and producing practices and methods are undergoing a great change, due largely to advancements in petroleum engineering. Papers and discussions at the division of production sessions held during the Fourth Mid-Year Meeting of the American Petroleum Institute, further revealed that many new developments are to be anticipated in the near future.

Greater operating efficiency, lower costs, improved technique, new conceptions of producing practices and methods are being achieved as a result of increased engineering studies. Mid-Continent engineers stated drilling costs in that region were being lowered constantly, due solely to progress in technique. The chief benefits during the past year have been the development of a better understanding of under-ground conditions existing in oil reservoirs. With this knowledge as a basis, advancements in the future are expected more rapidly and to be more beneficial to oil operators. For example, it is now recognized that bottom-hole pressures, sand face thickness, porosity and saturation are factors that cannot be overlooked in the allocation of production on an equal withdrawal basis. Likewise, an economical and efficient well spacing program is imperative to the welfare of the industry, as is the conservation of reservoir pressures and the adoption of methods promoting greater returns to operators.

Another important disclosure of these sessions was the possibilities and importance of probable future deep development in the Eastern District. Deep drilling in this region is only in its infancy. These deeper buried sands are yielding gas production and since gas reserves in the region need to be enlarged to meet the demand, increased drilling may be anticipated. Production papers on Eastern practices further showed that only a small percentage of the recoverable oil has been extracted and that the territory will continue to be a profitable producer for many years.

Coming East for the first time with its mid-year meeting, the Division of Production of the American Petroleum Institute found considerable interest in the operating practices and future recovery trends of the oil fields of eastern United States, many of which will be applied later to other regions of the nation, and probably the world.

Surveys of Pennsylvania's eastern plateaus, from McKean County east to Susquehanna County, have revealed about 20 anticlines with approximately 35 domed areas that may be considered favorable sites for the accumulation of natural gas, S. H. Catchcart, Pennsylvania State Geological Survey, said in his paper "Deep Sand Developments in the Eastern Area," which opened the group session.

This area, embracing 12,000 square miles and with anticlines extending 1000 miles, includes the district of present interest in the Oriskany sands, with folds and faults as prominent features. The territory is believed to include three independent pools, with the probable area of the main pool between six and eight square miles. Not all the Northern Pennsylvania pleateau country can be considered equally as favorable for prospecting, the speaker said.

Recent Development

Development of the Oriskany sand, begun as recently as March, 1930, and in September and November of the same year the Tioga and Hebron fields were discovered. The Oriskany now is productive at two other localities.

Drilling of deep wells in the eastern fields to reach the Oriskany and other sands 4000 to 6000 feet deep was suggested by Frank E. Eckert, of Hanley & Bird, Bradford, Pennsylvania, as a means

of assuring a larger reserve supply of natural gas. Eckert recommended closer cooperation with geologists and the drilling of deep wildcat wells. The speaker declared that better deep drilling equipment has been developed and that rotary equipment can be used advantageously on these wells.

"I believe now is the time to build up our reserve by more deep sand drilling," he said. "Surely, since it has been found that the Oriskany and Medina sands are gas bearing, other pools can be discovered as these sands underlie such a vast area."

Economics of Small Wells

Herman J. Little, South Penn Oil Company, Pittsburgh, said that in the Appalachian area the care and operation of small wells have demanded a studious survey of replacements from more durable materials, and that dwindling of natural gas supply has necessitated closer attention to oil heating conditions for pipe line runs. Generally, he said, operators of smaller wells are paying more attention to increasing efficiency.

"The average owner of stripper wells," Little declared, "may be said to have opportunities ahead of him if he but study his property carefully, analyze his costs and plan thoughtfully for the future. The property must be kept in good physical operating shape by gradual replacement of more durable equipment to keep down future costs, and a very conservative and studious experimental management of the producing wells for the greater recovery of oil from the sand."

Water flooding probably will add 24,000,000 barrels of oil to the total of approximately 315,000,000 barrels recovered already from the Bradford field, according to C. B. McClintock, Sloan & Zook Company, Bradford. At the present rate of production, he estimated in his paper, the life of the field at 20 to 25 years, with present research work likely to increase both the recovery and longevity.

K. A. Covell, The Pure Oil Company, Chicago, in his paper brought out that treatment with acid is having beneficial effect upon the productive abilities of wells in Michigan. In a year and a half more than 450 wells have been given more than 1000 acid treatments, using approximately 1,000,000 gallons of acid. He states the net result was the stimulation and conservation of production that otherwise might have been delayed or never materialized.

High Cost of Close Spacing

The greatest ultimate recovery of oil results not from the closest spacing of wells in a field, the common American practice, but from relatively wide spacing, engineers were told by John R. Suman, vice president for Humble Oil & Refining Company, Houston. The secret of obtaining the largest possible recovery from an oil field reservoir lies in making the most efficient use of the so-called reservoir energy, the principal and practically only agency for expelling oil from natural reservoir pore space and for lifting oil through the wells to the surface, he continued.

Unnecessarily close space results, Suman added, in increased production costs. He estimated that in the poorly controlled East Texas field, where 13,000 wells already have been drilled, 22,500 wells may be drilled, whereas 5000 would have served more efficiently to recover the oil. Suman stated that a new ruling of the Texas Railroad Commission, which is known as the equal-distance location order, and which has been passed since the preparation of his paper, permits operators to drill without a hearing, on a site of equal distance from property lines as offsets are located. He estimated that this might result in the drilling of an additional 9500 wells.

This useless expenditure of 16 cents per barrel instead of a possible three cents, represents an added burden of $2,000,000 per month on the field throughout its entire life.

Reduction of Drilling Costs

C. L. Moore, of Chanslor-Canfield Midway Oil Company, Fellows, California, and H. S. Stark, Honolulu Consolidated Oil Corporation, Taft, California, also called attention to the possibility of reducing drilling costs, suggesting that it could be made effective through close inspection of production and equipment records and their interpretation. They presented a study of records kept with a number of wells, and showed, as a result of the data and experience gained, it was possible to reduce oil lifting costs by 14 percent between 1932 and 1933.

Discussing the effect of chemical treatment of well fluid on tubing corrosion, Walter F. Rogers, Gulf Production Company, Houston, said that corrosion on oil well surface equipment by oil well brines often entails large monetary losses, particularly in Gulf Coast fields. The problem is encountered sooner or later in practically all fields, he said, with a cost so great as to stimulate interest in the development of corrosion-resistant equipment. Attempts made to neutralize brines containing hydrogen sulfide by adding sodium-hydroxide solution have tended to decrease, he stated, but not to eliminate, corrosive attacks. Precipitation of calcium and magnesium salts was found to be effective in reducing the corrosion of city water mains and he expressed the belief in the possibility of assuring a continuous coat of this protective nature for oil well equipment.

Deep Well Equipment

Problems related to building equipment necessary to drill and operate deep oil and gas wells were discussed by W. C. Shutts, Humble Oil & Refining Company, Houston, in a paper stressing the need of stronger joints for casing and drill pipe used in wells 10,000 feet deep. Wells are now being drilled to 10,000 feet and it is not uncommon to set 8500 feet or more of casing.

Higher strength steel and joints of greater efficiency must be used to provide adequate safety factors for 10,000-foot wells, Shutts said, explaining that work already is under way on the development of such extra-strength tubular goods.

A magnetic test designed to reveal defects in steel was described in a paper entitled, "The Magnaflux Test for Discontinuities in Steel," by A. V. De Forest, consulting metallurgical engineer of New York City.

Cast iron, long occupying a position of inferiority among metals, has been so improved for alloying that it now is a competitor of steel, it was disclosed in a paper on the properties of nickel-alloy cast irons and their special application in petroleum production equipment which was prepared by O. B. J. Fraser and J. S. Vanick, The International Nickel Company, New York. Better grades of nickel-alloy cast iron now can be used under circumstances where resistance to shock is essential, particularly in sub-zero weather, it was stated. High-strength varieties are being used successfully at high temperatures and for gears, pinions, piston rings, valves, pump plungers, etc.

Specification Changes

The committee on casing, drill pipe and tubing amended its specifications to include electric welded casing and tubing, which material already has been included in the line pipe specifications. The committee also adopted a large number of relatively minor changes, which were made to clarify and strengthen existing specifications.

The committee on rotary drilling equipment approved as final standards adopted tentatively at the Tulsa meeting in May, 1932. The industry will be circularized immediately. These specifications were adopted so as to form a group order for the purchase of gauges.

The committee on pumping equipment now has actively under way preparation of standards on cold-drawn and liner type rod or inserted pumps. In addition this committee adopted one minor change in dimensions of rods, with corresponding changes in gauges, which it is said, will in no way weaken by the physical strength of the joints, but which will permit manufacturers to meet specifications 100 percent.

MEN IN THE INDUSTRY'S NEWS

WILLIAM R. BOYD, JR.

WILLIAM R. BOYD, JR.

Executive Vice President of the American Petroleum Institute

who will have the degree of doctor of laws conferred on him shortly by St. Bonaventure College, according to announcement made at the fourth Mid-Year meeting of the institute, in Pittsburgh.

The degree will be awarded June 12, at commencement ceremonies dedicating a new arts and science hall at St. Bonaventure to Joseph de la Roche d'Allion, discoverer of petroleum, whose name the structure will bear.

"In an effort to link the past with the present," Rev. Thomas Plassman, president of St. Bonaventure, wrote Mr. Boyd, "The faculty has voted to confer honors on outstanding men of the oil industry. Naturally we turn our eyes to the American Petroleum Institute which, in our opinion, is the unifying association, or the intellectual clearing house, of the whole industry."

Father Plassman, inviting Mr. Boyd to represent the institute at the dedication ceremonies and to receive the degree, reminded him of their mutual friendship with the late Robert Welch, the original director of the oil industry's trade association.

"I am honored by the invitation," Mr. Boyd wrote in reply, "and I accept with pleasure, although it should be said that I am entirely conscious of the fact that there are many oil men who deserve more than I do the honor you desire to confer."

T. **R. BATTE, JR,** former technical advisor to Dan Moran, president of Continental Oil Company, has been transferred from Ponca City, Oklahoma, to Houston to become division superintendent of the Gulf Coast division. The Houston office was until a short time ago a district office under the Fort Worth divisional office, but due to Continental Oil Company's increased Gulf Coast and South Texas operations, it has been made a full division office, reporting direct to Ponca City.

MYLON C. JACOBS, formerly with Walworth Company, now is associated with the Oil Well Improvements Company of Tulsa in the sale of Heggem rotary valves.

W. **K. GORDON,** veteran official of the Texas Pacific Coal & Oil Company, Fort Worth, was elected chairman of the board May 24, succeeding Edgar L. Marston, retired Los Angeles capitalist. Gordon aided in organizing the company in 1888 to engage primarily in the coal mining business in West Central Texas, and has served throughout the ensuing period in various executive capacities. Discovery of oil at Ranger led the company to shift its activities largely to the oil industry, as it held a vast amount of fee land in productive area.

S. F. SHAW, consulting engineer, has returned to San Antonio from a trip to East Texas and to Oklahoma City, where two gas lift plants have been erected for Westgate Oil Company and several placed on gas lift.

T. E. WARD, president of Oilfield Equipment Company, Inc., New York City, on May 25 sailed aboard the S. S. Majestic for England and Continental Europe. For several weeks prior to sailing Mr. Ward was in the Mid-Continent district, where he visited the International Petroleum Exposition and the East Texas oil field.

K. UYENO, engineer and district manager of production of Nippon Oil Company, Byoritsu, Formosa, Japan, was a visitor in Houston during the week. He is making a study of Gulf Coast pressure control methods.

A. D. DONNELLY, production superintendent in the Kansas-Oklahoma-Kentucky division of The Texas Company, has been placed on the retired list effective May 1. Donnelly came to the Mid-Continent area from the fields of Pennsylvania and had been with The Texas Company for 25 years, most of which time was spent in the division of which he was superintendent.

CAPT. A. E. HIGGINS, manager of the southwestern division for American Gas Association, was a business visitor in Tulsa during the week.

M. G. CHENEY, consulting geologist of Coleman, Texas, presented a paper, "The Concho Arch," before the Tulsa Geological Society on Monday evening, May 21. Cheney is secretary-treasurer of the American Association of Petroleum Geologists.

MELVIN T. DRISCO, formerly land man for Ohio Fuel Supply Company, has been made manager, succeeding F. S. Pratt who recently retired.

HARRY E. CLARK, president of Laurel Oil & Gas Company since its organization in 1903, died early Tuesday, May 22, at Hermann Hospital in Houston, Texas. Death followed a heart attack there December 13, 1933. Clark was a veteran of eastern fields who came to the Mid-Continent during the Bartlesville-Dewey boom and was one of the developers of the now famous Glenpool. Although he had made his home in Philadelphia for several years, operating headquarters for the company had been in Tulsa where Virgil Hicks is manager. Interment was held in Philadelphia.

President's Approval *Of Ickes Oil Control Bill* Does Not Stop Fight

Washington. — The Thomas-Disney oil control bill this week was made part of the administration's "must" program by a letter from the President May 22 to the chairman of the Senate and House committees in charge of the legislation, urging its prompt enactment.

"Collapse of the whole structure" and a return to the "wretched conditions" existing a year ago will result if the bill is not enacted, the President declared.

"I have received a disturbing letter from the administrator for the petroleum industry, Hon. Harold L. Ickes, informing me of the continued daily production of oil in excess of the maximum amount determined on by the administrator pursuant to authority under the petroleum code," the President wrote.

"The administrator states that the records of the Bureau of Mines during the first three months of this year show a daily average production of 'illegal' oil of 149,000 barrels.

"Technically speaking, this may not all have been 'hot' oil, but in a real sense it is, since it is oil produced in excess of the allowable. While the final figures of the Bureau of Mines are not available for the months of April and May, it is unquestionably true that there is growing disregard for production orders issued under the petroleum code and that the trend of hot oil produced is upward. For example, it is stated on reliable authority that the daily excess production in the East Texas field alone is running at 60,000 to 75,000 barrels per day. Other estimators say this figure should be much higher.

"If the principle of prorating production under a code is to be maintained, it seems necessary that the existing law should be strengthened by the passage of the bill which has been introduced in the Senate by Senator Thomas and in the House by Congressman Disney and supported by the oil administrator.

"It is a simple fact that as a result of the work of the oil administrator definite progress has been made both in eliminating unfair practices and in raising the price of crude petroleum to a reasonable level, which has brought added employment and more fair wages to those engaged in oil production.

"I am frankly fearful that if the law is not strengthened, illegal production will continue and grow in volume and result in a collapse of the whole structure. This will mean a return to the wretched conditions which existed in the spring of 1933.

"I hope therefore that the proposed legislation can be enacted. I do not want to see this important American industry reduced to the condition under which it was operating before the oil administration started its work.

Ickes Answers Attacks

Continuing the battle between opponents of the legislation and himself, oil administrator Ickes during the week issued a sharp reply to charges of the Independent Petroleum Association of California that his actions are imperiling the independents because of discrimination in favor of the larger companies and that the proposed legislation would build up a monopoly.

"No two statements could be further from the truth," the administrator declared.

"It is physically impossible to help the independents without helping the major companies, because the latter, by vortue of their size alone, will share in all benefits. No order I have issued discriminates against the small operator, nor will any discrimination by other oil interests be tolerated.

"As for the proposed oil bill building up a monopoly; unless production is balanced with consumer demand, a monopoly will be firmly entrenched, because the small fellows cannot stand up against the withering competition of the larger companies which would result from unchecked production. They would be drowned in a great flood of oil, while the major operators, with branches in every division of the industry, and their financial strength, would survive."

Ickes Opposes Two-Year Limit

Characterizing wastefulness in the oil industry as a "national tragedy" and intimating that state regulation has been practically a total failure, Secretary of the Interior Harold L. Ickes, oil administrator, on May 21 plead with members of the Senate mines and mining subcommittee for immediate action on the Thomas-Disney oil control bill.

As the opening witness at the six-hour hearing granted by the subcommittee, Mr. Ickes outlined the situation in the industry and explained the legislation, discussing the Disney version chiefly, that being a revision of

Federal Allocation Increased 162,100 Barrels for June

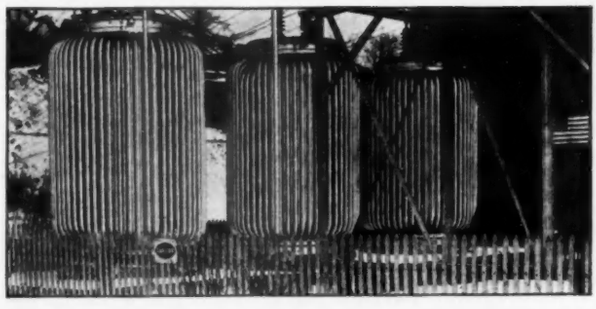
Washington, D. C.—A further increase in the allowable crude oil production, effective June 1, was announced by Oil Administrator Harold L. Ickes May 21, when the June daily output was set at 2,528,300 barrels, an increase of 162,100 barrels over the quota for April and May. The increase, authorized to meet the seasonal demand, will become effective at 7 a.m., standard time, June 1.

All of the producing states share in the increased allotments, the bulk of the increase, of course, going to the four largest producers—Texas, Oklahoma, California and Kansas.

The new allocations, compared with those now in effect, are as follows:

	June	April-May
Texas	1,032,300	980,700
Oklahoma	511,700	476,400
California	500,300	462,500
Kansas	130,300	122,100
Louisiana	83,000	72,400
New Mexico	48,000	45,800
Pennsylvania	44,000	38,200
Wyoming	36,000	32,400
Arkansas	33,000	32,300
Michigan	32,800	31,300
Kentucky	13,100	12,800
Illinois	12,600	12,500
Ohio	12,900	12,500
West Virginia	12,300	11,700
New York	11,700	9,700
Montana	8,500	7,700
Colorado	3,500	3,000
Indiana	2,300	2,200
Total	2,528,300	2,366,200

New Advisory Service Developed by Well Known Paint Manufacturer



Silvr-Cool Helps to Dissipate Heat Makes Transformers Last Longer

Degraco has developed a special aluminum paint called "Silvr-Cool" that gives many surprising advantages over ordinary aluminum paints. It is made with a special aluminum-bronze powder, super-polished, extra fine. The vehicle and mixing methods used are Degraco secrets. Tests prove that Silvr-Cool leafs more uniformly, stays brilliant much longer, controls temperature as much as 32% better than ordinary aluminum paints. Enables transformers to handle larger loads, last longer. Protects tanks against evaporation. Write today for prices and complete details of this or any other type paint you need.

DEGRACO PAINTS VARNISHES ENAMELS

Gives a Quick Solution for Every Paint Problem

Here is a special kind of industrial painting service designed exclusively to serve business executives, engineers and plant maintenance men. It is offered by one of America's largest manufacturers of industrial paints, a company that has specialized for over 50 years in solving painting problems for industry. No similar service is available to you anywhere else, for it not only aids you in selecting the right paint but also gives you full details as to its application on each particular job. For example: shows you how to save loss of time—how to cut costs—how to overcome special acid-fume or moisture conditions—etc. As part of this service a new "Easy Way" paint chart is offered. The coupon below will bring you a FREE copy of the chart along with details of the special Degraco advisory service without obligation.

DETROIT GRAPHITE COMPANY, DETROIT, MICH.

DETROIT GRAPHITE COMPANY
538 Twelfth Street, DETROIT, MICH.

Please send me an "Easy Way" paint chart also facts about special service for industrial paint buyers.

*Name*_____

*Company*_____

*Town*_____ *State*_____

President's Approval *Of Ickes Oil Control Bill* Does Not Stop Fight

Washington. — The Thomas-Disney oil control bill this week was made part of the administration's "must" program by a letter from the President May 22 to the chairman of the Senate and House committees in charge of the legislation, urging its prompt enactment.

"Collapse of the whole structure" and a return to the "wretched conditions" existing a year ago will result if the bill is not enacted, the President declared.

"I have received a disturbing letter from the administrator for the petroleum industry, Hon. Harold L. Ickes, informing me of the continued daily production of oil in excess of the maximum amount determined on by the administrator pursuant to authority under the petroleum code," the President wrote.

"The administrator states that the records of the Bureau of Mines during the first three months of this year show a daily average production of 'illegal' oil of 149,000 barrels.

"Technically speaking, this may not all have been 'hot' oil, but in a real sense it is, since it is oil produced in excess of the allowable. While the final figures of the Bureau of Mines are not available for the months of April and May, it is unquestionably true that there is growing disregard for production orders issued under the petroleum code and that the trend of hot oil produced is upward. For example, it is stated on reliable authority that the daily excess production in the East Texas field alone is running at 60,000 to 75,000 barrels per day. Other estimators say this figure should be much higher.

"If the principle of prorating production under a code is to be maintained, it seems necessary that the existing law should be strengthened by the passage of the bill which has been introduced in the Senate by Senator Thomas and in the House by Congressman Disney and supported by the oil administrator.

"It is a simple fact that as a result of the work of the oil administrator definite progress has been made both in eliminating unfair practices and in raising the price of crude petroleum to a reasonable level, which has brought added employment and more fair wages to those engaged in oil production.

"I am frankly fearful that if the law is not strengthened, illegal production will continue and grow in volume and result in a collapse of the whole structure. This will mean a return to the wretched conditions which existed in the spring of 1933.

"I hope therefore that the proposed legislation can be enacted. I do not want to see this important American industry reduced to the condition under which it was operating before the oil administration started its work.

Ickes Answers Attacks

Continuing the battle between opponents of the legislation and himself, oil administrator Ickes during the week issued a sharp reply to charges of the Independent Petroleum Association of California that his actions are imperiling the independents because of discrimination in favor of the larger companies and that the proposed legislation would build up a monopoly.

"No two statements could be further from the truth," the administrator declared.

"It is physically impossible to help the independents without helping the major companies, because the latter, by vortue of their size alone, will share in all benefits. No order I have issued discriminates against the small operator, nor will any discrimination by other oil interests be tolerated.

"As for the proposed oil bill building up a monopoly; unless production is balanced with consumer demand, a monopoly will be firmly entrenched, because the small fellows cannot stand up against the withering competition of the larger companies which would result from unchecked production. They would be drowned in a great flood of oil, while the major operators, with branches in every division of the industry, and their financial strength, would survive."

Ickes Opposes Two-Year Limit

Characterizing wastefulness in the oil industry as a "national tragedy" and intimating that state regulation has been practically a total failure, Secretary of the Interior Harold L. Ickes, oil administrator, on May 21 plead with members of the Senate mines and mining subcommittee for immediate action on the Thomas-Disney oil control bill.

As the opening witness at the six-hour hearing granted by the subcommittee, Mr. Ickes outlined the situation in the industry and explained the legislation, discussing the Disney version chiefly, that being a revision of

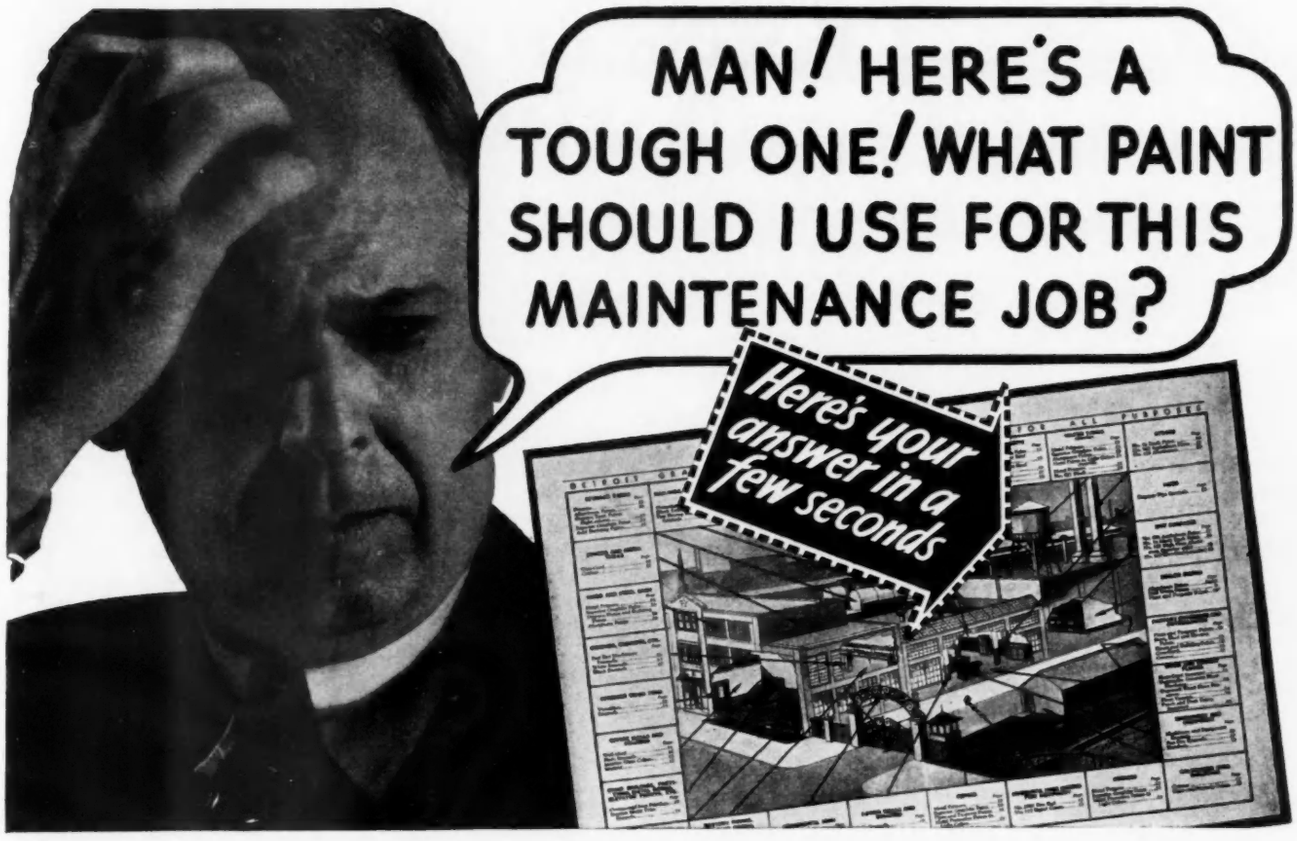
Federal Allocation Increased 162,100 Barrels for June

Washington, D. C.—A further increase in the allowable crude oil production, effective June 1, was announced by Oil Administrator Harold L. Ickes May 21, when the June daily output was set at 2,528,300 barrels, an increase of 162,100 barrels over the quota for April and May. The increase, authorized to meet the seasonal demand, will become effective at 7 a.m., standard time, June 1.

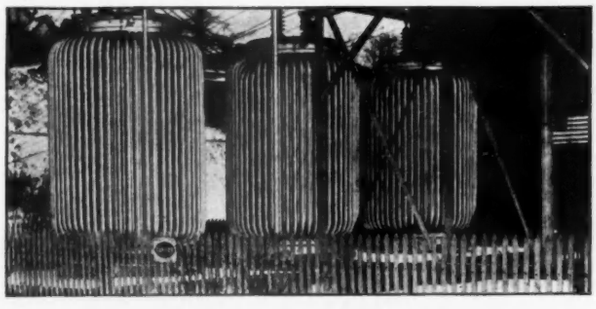
All of the producing states share in the increased allotments, the bulk of the increase, of course, going to the four largest producers—Texas, Oklahoma, California and Kansas.

The new allocations, compared with those now in effect, are as follows:

	June	April-May
Texas	1,032,300	980,700
Oklahoma	511,700	476,400
California	500,300	462,500
Kansas	130,300	122,100
Louisiana	83,000	72,400
New Mexico	48,000	45,800
Pennsylvania	44,000	38,200
Wyoming	36,000	32,400
Arkansas	33,000	32,300
Michigan	32,800	31,300
Kentucky	13,100	12,800
Illinois	12,600	12,500
Ohio	12,900	12,500
West Virginia	12,300	11,700
New York	11,700	9,700
Montana	8,500	7,700
Colorado	3,500	3,000
Indiana	2,300	2,200
Total	2,528,300	2,366,200



New Advisory Service Developed by Well Known Paint Manufacturer



Silvr-Cool Helps to Dissipate Heat Makes Transformers Last Longer

Degraco has developed a special aluminum paint called "Silvr-Cool" that gives many surprising advantages over ordinary aluminum paints. It is made with a special aluminum-bronze powder, super-polished, extra fine. The vehicle and mixing methods used are Degraco secrets. Tests prove that Silvr-Cool leafs more uniformly, stays brilliant much longer, controls temperature as much as 32% better than ordinary aluminum paints. Enables transformers to handle larger loads, last longer. Protects tanks against evaporation. Write today for prices and complete details of this or any other type paint you need.

DEGRACO PAINTS VARNISHES ENAMELS

Gives a Quick Solution for Every Paint Problem

Here is a special kind of industrial painting service designed exclusively to serve business executives, engineers and plant maintenance men. It is offered by one of America's largest manufacturers of industrial paints, a company that has specialized for over 50 years in solving painting problems for industry. No similar service is available to you anywhere else, for it not only aids you in selecting the right paint but also gives you full details as to its application on each particular job. For example: shows you how to save loss of time—how to cut costs—how to overcome special acid-fume or moisture conditions—etc. As part of this service a new "Easy Way" paint chart is offered. The coupon below will bring you a FREE copy of the chart along with details of the special Degraco advisory service without obligation.

DETROIT GRAPHITE COMPANY, DETROIT, MICH.

DETROIT GRAPHITE COMPANY
538 Twelfth Street, DETROIT, MICH.

Please send me an "Easy Way" paint chart also facts about special service for industrial paint buyers.

*Name*_____

*Company*_____

*Town*_____ *State*_____

the original bill introduced by Senator Thomas of Oklahoma.

The two-year limitation on the measure provided in the bill submitted by Congressman Disney of Oklahoma is highly objectionable to the oil administrator, it was made clear, and testimony of other witnesses indicates a difference of opinion in the industry as to the desirability of short-term legislation.

"The hot oil production," he said, "is 60,000 barrels daily. This oil is being stolen from the property of adjacent land owners, and if it keeps up the market is bound to break."

Charging that the states themselves have failed to keep production in line with demand, the administrator declared that "limitation cannot be accomplished through state action.

"Texas, Oklahoma, and Kansas have regulation," he continued, "but they never could agree among themselves, and even if they did who knows but that California or other states would break over?"

At the same time, he denied specifically that there is any attempt on the part of the administration to supersede the state control bodies, the aid of which, he said, will be invaluable in administering the proposed law.

"This is a vitally important measure and I think passage is imperative at this session of Congress," Mr. Ickes said. "It is obvious that the states are inherently incapable of regulating an industry so national in scope."

Passage of the bill would plug loopholes in the oil code, provide adequate penalties for violations and block "hot" oil production, he asserted.

"Federal regulation of oil production is absolutely necessary to stop the flooding of the market with oil," he contended.

Identifying himself as a "country editor from Tyler, Texas," Carl Estes, newspaper publisher, urged enactment of the measure to eliminate "oil thieves," at the same time declaring he has never been an advocate of federal control.

"There are a few honest men in the Texas oil fields," he declared, "but about 85 percent of them are plain unadulterated thieves just as Secretary Ickes told you. They are operating a racket that would put Al Capone to shame."

Pennsylvania operators are in favor of the measure, the subcommittee was told by W. J. Brundred, representing the Pennsylvania Grade Crude Oil Association, who asserted that only a "small but vociferous and well organized" minority are opposed to federal control.

(*Continued on page 52*)

U. S. Circuit Court *Hearing in Texas Suit* Upholds Oil Code Power

New Orleans, Louisiana.—Federal government regulation of the oil industry through authority of the NIRA petroleum code was sustained by the United States Fifth Circuit Court of Appeals here May 22 in a decision reversing the judgment of a federal district court in East Texas.

Sanctioning federal regulation of intrastate as well as interstate oil activities, the decision nullified injunction granted against federal agents last February to Panama Refining Company and others engaged in producing, refining, and transporting oil upon intrastate scale in East Texas.

Several weeks ago the New Orleans court had ordered a temporary stay of the injunction, leaving the federal agents free to resume their activities in the big field, and the May 22 action represented permanent setting aside of the injunction.

Although the New Orleans decision represents an important victory for the whole NIRA as well as the oil code administration, the litigation is not yet at an end. For the attorney for Panama Refining Company and the other complainants indicated immediately after learning of the decision that the case will be appealed to the United States Supreme Court.

Washington.—Louis R. Glavis, chief of the investigation division of the Department of the Interior, left here May 25 by airplane to direct the government's drive against illegal oil production in East Texas. Field investigators met him in Dallas May 26 to plan activities.

Resumption of the drive against code violations follows the decision of the fifth court of civil appeals in New Orleans to the effect that the National Industrial Recovery Act and orders issued under the petroleum code are constitutional.

Harold L. Ickes, administrator of the petroleum code said: "It is my intention that these men shall feel the lash of the law which they have so long and so brazenly flouted."

Ickes Sees New Orleans Decision As Great Victory

Washington. — Characterizing as a "terrific blow" to opponents of the oil code the decision of the New Orleans Federal Circuit Court upholding the constitutionality of the oil administration Secretary of the Interior Harold L. Ickes this week expressed the view that the decision will offset the effects of adverse decisions in the lower Texas courts and leave him free to demand compliance with the code.

However, it was admitted, the decision will probably be appealed to the United States Supreme Court, creating a further period of uncertainty. The probability that no final decision on the issue will be reached before next fall, the administrator said, emphasizes the need for prompt congressional action on the oil control bill.

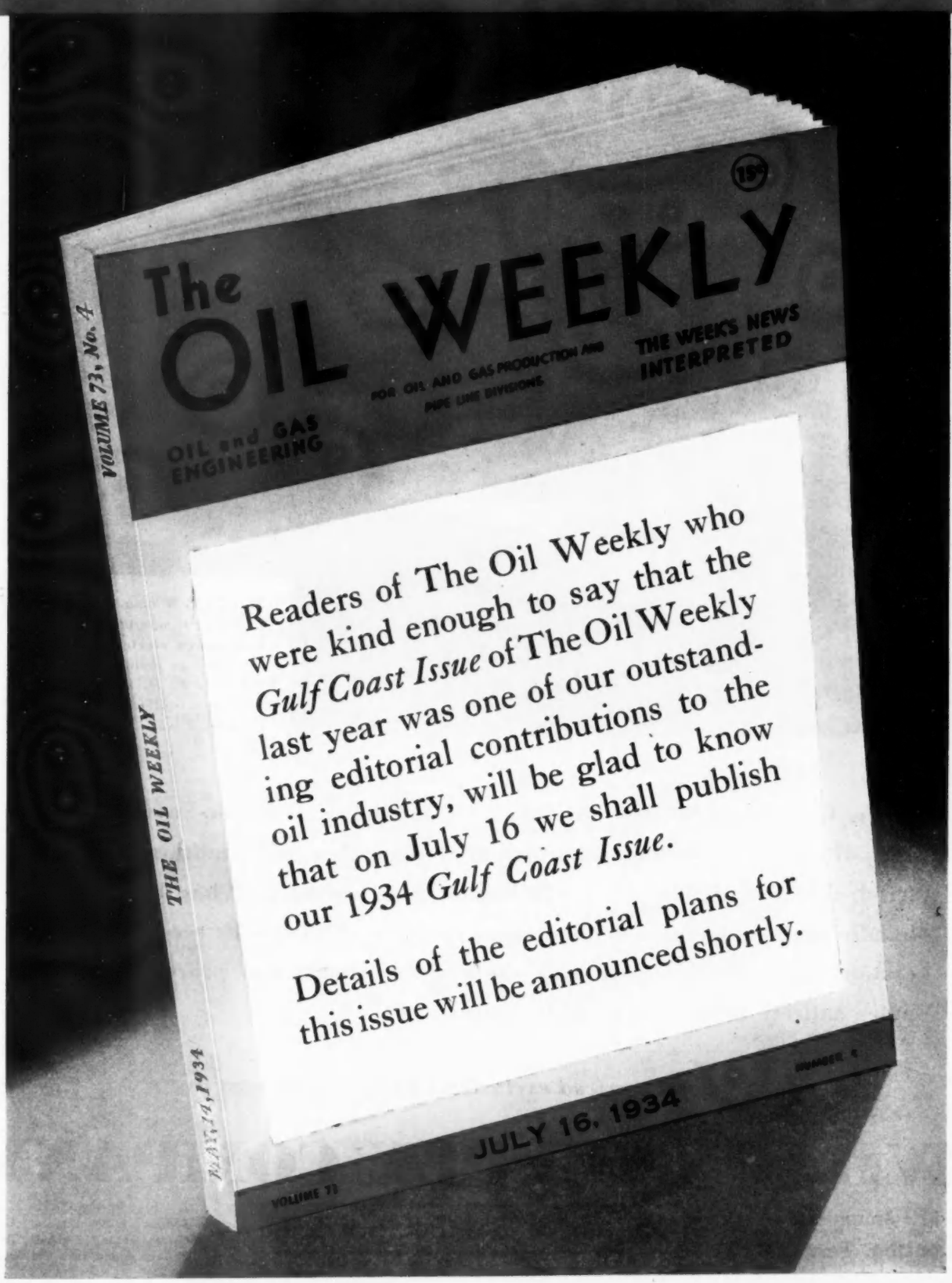
"As I see the decision," Ickes declared, "It leaves me free as oil administrator to continue the work of so directing the oil industry as a whole that this great natural resource will not be squandered, as a few selfish oil men would have it, regardless of the effect of overproduction on the industry as a whole. It leaves me free so to direct the industry that consumption will be balanced with demand, that all elements in the industry will receive a fair price for their product, and at the same time pay a fair wage to all oil workers. The decision, to my mind, again upholds the entire legislative background of the National Recovery Administration.

"It must be remembered that doubtless the decision will be appealed to the Supreme Court, which will leave a further period of uncertainty in administration of the oil code, which, taken into consideration with the fact that the life of this and all other codes is a short one, emphasizes the urgent necessity for passage of the oil bill pending in congress.

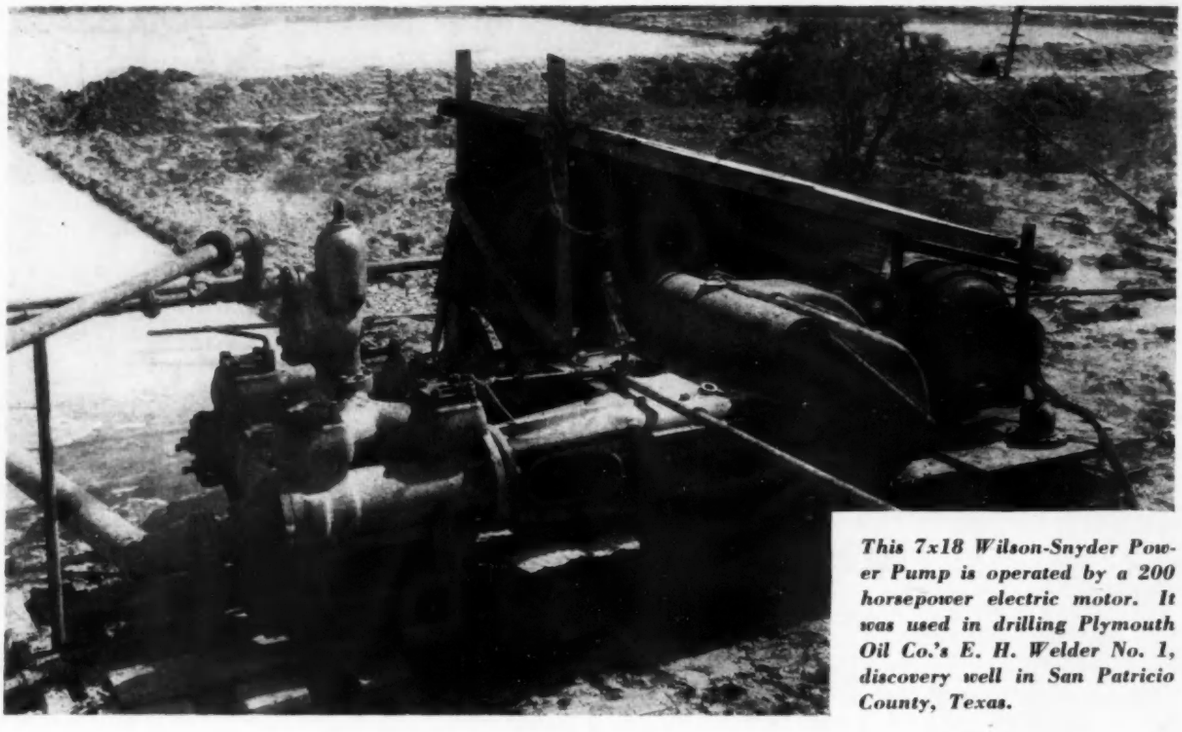
"The decision is a terrific blow to those opponents of the oil bill who have based their opposition on the supposition that the courts would hold the measure unconstitutional.

"The vast majority of all elements in the oil industry realize the absolute necessity for a continued measure of control of their industry, backed with the specific authority of law."

COMING • JULY 16th
Annual Gulf Coast Issue


The OIL WEEKLY
FOR OIL AND GAS PRODUCTION AND PIPE LINE DIVISIONS
THE WEEK'S NEWS INTERPRETED
OIL and GAS ENGINEERING
VOLUME 73, No. 4
Readers of The Oil Weekly who were kind enough to say that the Gulf Coast Issue of The Oil Weekly last year was one of our outstanding editorial contributions to the oil industry, will be glad to know that on July 16 we shall publish our 1934 Gulf Coast Issue.
Details of the editorial plans for this issue will be announced shortly.
JULY 16, 1934
THE OIL WEEKLY

Another discovery for
WILSON-SNYDER



This 7x18 Wilson-Snyder Power Pump is operated by a 200 horsepower electric motor. It was used in drilling Plymouth Oil Co.'s E. H. Welder No. 1, discovery well in San Patricio County, Texas.

When Gulf Coast drillers go into new territory, a Wilson-Snyder pump goes with them. It is their assurance that regardless of conditions encountered, this dependable pump will handle them properly. It has the power to handle high pressures—it gives them speed in drilling—its economical operation keeps drilling costs low—its rugged construction practically eliminates entirely break downs and repairs.

Sold and serviced exclusively on the Gulf Coast by

WILSON SUPPLY COMPANY

1412 Maury St.
Houston, Texas

OIL and GAS WELL SUPPLIES

BRANCHES
Barbers Hill, Kilgore, Gretа, Gladewater and Tomball, Texas; Shreveport and Lake Charles, La.

Production Engineering

Acid Treatment of Michigan Oil Wells

K. A. COVELL
The Pure Oil Company
Chicago, Illinois

USE of acid to stimulate oil production from Michigan lime wells has shown a need for a study of acid treatment involving an analysis of the formation to be treated, the selection of a suitable type and amounts of acid, the time of treatments with respect to date of well completion, and an economic analysis of the results.

This paper was read before the Mid-Year Meeting of the American Petroleum Institute at Pittsburgh, May 24, 1934.

THERE are now about 900 producing oil wells in Michigan, of which number about 700 are producing from limestone formations considered favorable for the stimulation of production by the use of acid. During the past year and one-half over 450 wells have been given more than 1000 acid treatments, using approximately 1,000,000 gallons of hydrochloric acid. The net result of these treatments has been the stimulation and the conservation of oil production that might have otherwise been delayed or never produced because of the economics of operating small wells.

While acid treatment of wells has been in progress, laboratory research and field tests have been continued with a view of obtaining better results by the use of an acid suited to the formation to be treated, the determination of the amounts of acid to use, the time for initial and successive treatments, and the analysis of the increase or early recovery in oil production.

Acid Suited to Formation

Even though hydrochloric acid reacts to dissolve pure limestones,[1a] operators have found it advisable to furnish to the chemical-treating company for analysis a sample of the producing formation to be treated, particularly if the treatment is to be made on a well in a new area where the pay formation may be dolomitic or partially consist of materials not readily dissolved by acid. The variation in the action of two types of acid on the Traverse limestone is indicated in Table 1.

In Table 1, well "C" is a striking example of the advantages of determining proper acid to use for the formation to be treated. It further develops that the producing formations of a well often vary in acid-soluble materials with depth. Table 2, showing the change in solubility of the pay formation with the depth of a well, indicates that acid "B" probably will dis-

TABLE 1

WELL	Depth		Solubility In	
	From (Feet)	To (Feet)	Acid "A" (Percent)	Acid "B" (Percent)
A	1,883	1,884	94.2	96.3
B	1,774	1,777	79.4	83.4
C	1,754	1,755	68.3	90.8
D	1,759	1,766	74.7	77.0
E	1,752	1,759	45.9	50.3

TABLE 2

Depth		Solubility In:	
From (Feet)	To (Feet)	Acid "A" (Percent)	Acid "B" (Percent)
3,629	3,635	68.4	87.0
3,635	3,639	83.8	85.7
3,644	3,649.5	97.5	97.6
3,652	3,654	73.7	60.6

[1a] Figures refer to bibliography on p. 4.

"VERY CONVENIENT"

Says R. P. Abele

SUNRAY OIL COMPANY

TULSA, OKLAHOMA

January 26, 1934.

Gulf Publishing Company,
Houston, Texas.

Gentlemen:

We have received the 1934 edition of Composite Catalog of Oil Field and Pipe Line Equipment and wish to congratulate you upon the completeness of this work and the form in which it has been placed together.

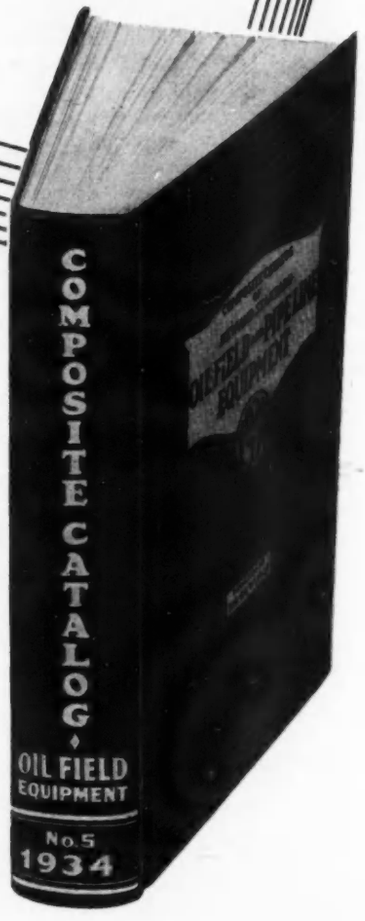
We have received previous editions and have found them to be very valuable in location sources of supply for various types of equipment. The Catalog is very convenient for locating types of material very quickly.

We wish to thank you very much for sending us a copy of this work.

Very truly yours,

RFA-EC

C. H. WRIGHT RECEIVER FOR
SUNRAY OIL COMPANY
By R. P. Abele
Production Supt.



Here is another production superintendent who is finding the Composite Catalog convenient for locating all types of materials very quickly.

And small wonder, because the 1934 Edition of the Composite Catalog not only describes standard equipment currently in use in all fields but contains descriptive matter on numerous pieces of equipment not hitherto described.

The superintendent, engineer, purchasing agent, executive and foreman who makes a habit of checking first in the Composite Catalog will save himself a great deal of time. If the descriptive matter is not as complete as it should, be a card is provided in the back of the Catalog for use in getting further information.

Use your Composite Catalog.

You'll find it in the

COMPOSITE CATALOG

of Oil Field and Pipe Line Equipment

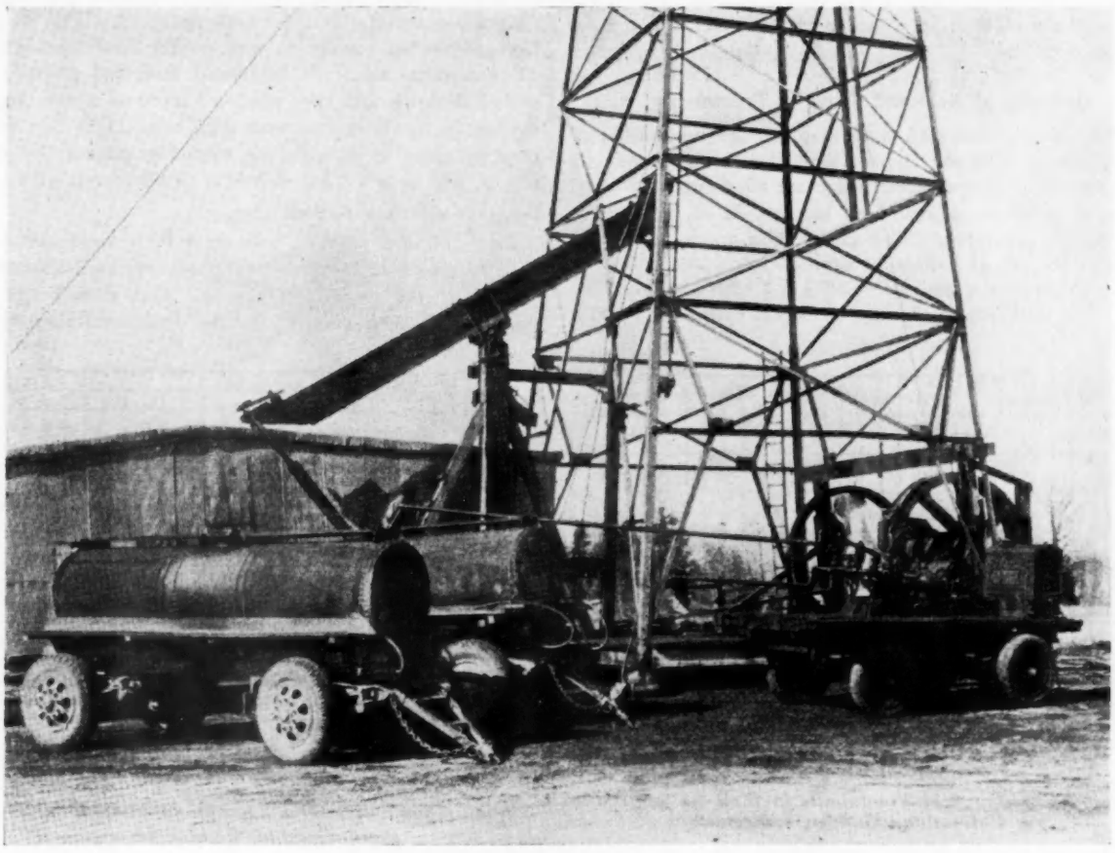


FIGURE 1

solve more material and, thus, offer better possibilities for increasing production by the use of acid.

Table 3 shows the wide variation in the percentage of solubility of a well core sample in various blends of acid, indicating the necessity of making analysis to determine the proper acid to obtain best results.

TABLE 3

ACID	Time Sample Immersed in Acid (Hours)	Solubility (Percent)
A	24	3.9
B	96	27.4
C	96	31.0
D	96	23.6
E	24	61.7
F	24	32.4

The Dundee limestone, which is probably the most prolific oil-producing formation in Michigan, has been found to be about 92 to 97 percent soluble in a 15-percent concentration of hydrochloric acid. One 42-gallon barrel of this strength acid[2] is calculated to dissolve about 0.4 cubic feet of formation and leave a resultant calcium-chloride solution about 71 percent saturated. It is considered good practice to use a properly-inhibited acid, which practically eliminates the reaction of acid with steel, and yet does not appreciably retard the action of the acid with limestone. The treating company, for example, can furnish an inhibited acid of 15 percent concentration which has no appreciable corrosive action on steel during the time required for treatment, while an equal strength of uninhibited or raw acid dissolves as much as 0.286 pounds of steel per square foot per day. Hydrochloric acid has no reaction with oil or natural gas.

Acids now can be furnished having various reaction speeds and intensities, and research work on the part of the chemical company has developed a blend of acid with which the reaction, when introduced into the formation, can be delayed for the most part until pressure is relieved in the well bore. This acid is as yet too costly for general use. Another interesting project being introduced is the development of a non-aqueous base acid which, with the limestone, forms a resultant solution requiring only one-tenth as much pressure to force it back out of the formation and into the well as the usual calcium-chloride solution requires. These, and other acids being developed, may increase the scope of treatment to include many wells that are now considered unfavorable for treatment.

Technique

The technique of treating wells with acid[3] requires the use of equipment such as illustrated by Figure 1, and requires experienced supervision in injecting acid under pressure with an oil or gas seal into the formation and determining the time necessary to keep the well shut in for complete reaction. The time required for acid to react depends upon the formation and blend of acid. Some wells have been produced as early as six hours following treatment, and in other wells the chemical reaction has not been completed after 72 hours.

Pre-treatment bottom-hole conditioning in the form of paraffin cleaning or the use of special "blanket" or "seal" preparations to protect water-bearing formations from the action of acid may be recommended by the well treater after formation and producing conditions are known. Another type of preparation which is now in use is in the form of a thin coating or filler which temporarily seals the pores of the formation, permitting low-pressure wells to be filled with fluid and, thus,

have available at the bottom of the hole a fluid pressure head to force the acid back into the formation after the coating has been dissolved.

Quantity of Acid and Time of Treatments

A study of the results of more than 350 acid treatments of wells producing from the Dundee limestone indicates amounts of acid and time of treatments which are consistent with good practice to result in a maximum increase in oil production. These wells will average about 3550 feet in depth, have from 10 feet to 50 feet of formation exposed below the oil casing string, and produce a 38-degree A.P.I. oil with practically no water. The thickness of the pay formation varies from a few

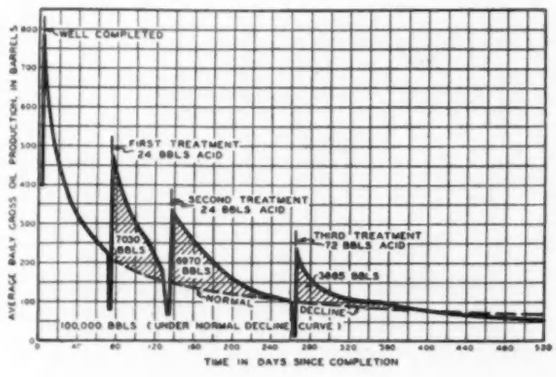


FIGURE 2

Effect of Successive Acid Treatments in Well "A"—Producing Formation, Dundee Limestone

Feet to as much as 10 feet or 15 feet, and sometimes occurs in as many as three zones. Figure 2 to 6, inclusive, showing the effect of acid treatment in increasing the rate of production from representative wells, are given herein better to illustrate the quantity of acid to use and the best time for treatment.

Figure 2 shows that well "A" produced about 17,865 barrels of oil more than it would have produced if the well had not been treated with acid during the first year. The application of acid treatment being consistent, this well would probably have shown a greater accumulated increase in production if the first treatment of 24 barrels of acid had been about 30 days after the well was completed, and if the second treatment of 24 barrels had been increased to about 48 barrels of acid at about the same time as shown.

Figure 3, for well "B," shows an increase of 8540 barrels,

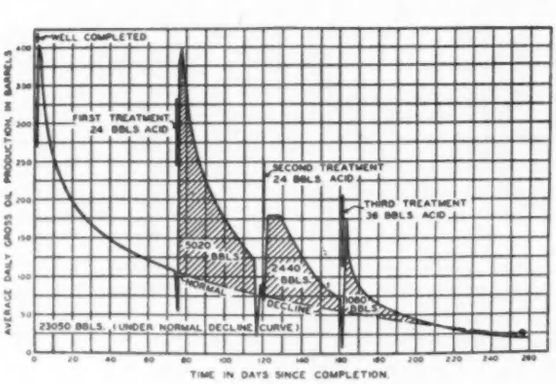


FIGURE 3

Effect of Successive Acid Treatments in Well "B"—Producing Formation, Dundee Limestone

or about 36 percent, in the accumulated recovery over the first seven months that the well produced. This well might have responded equally as well on the first treatment using 12 barrels instead of 24 barrels of acid, and probably in the period shown would have produced more oil above the normal decline if the first treatment had been 25 to 30 days after date of completion, with the second treatment the same as shown, and with a third treatment of 48 barrels of acid about 200 days after completion.

Figure 4, for well "C," shows a high accumulated return as a result of acid treatment immediately following the completion of the well, it is probable that even better results might have been obtained if the first treatment had been

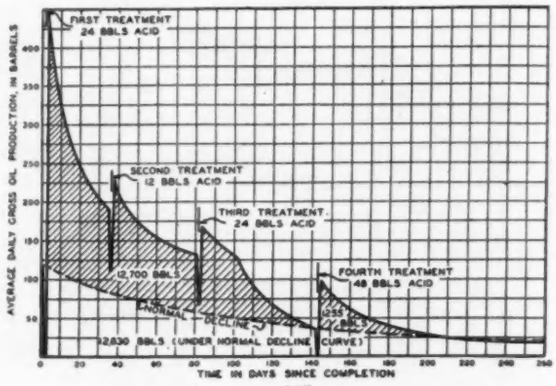

FIRST TREATMENT 24 BBLS ACID
SECOND TREATMENT 12 BBLS ACID
THIRD TREATMENT 24 BBLS ACID
FOURTH TREATMENT 48 BBLS ACID
12,700 BBLS
NORMAL DECLINE
12,830 BBLS (UNDER NORMAL DECLINE CURVE)
AVERAGE DAILY GROSS OIL PRODUCTION, IN BARRELS
TIME IN DAYS SINCE COMPLETION

FIGURE 4

Effect of Successive Acid Treatments in Well "C"—Producing Formation, Dundee Limestone

delayed 10 days, giving the well a chance to clean itself and establish movement of oil towards the hole. It may be noted that the second treatment of 12 barrels of acid did not materially increase the accumulated production, and it is believed that a second treatment of 24 barrels to 36 barrels of acid about 90 days after the first treatment would have netted higher returns. The fourth treatment, as shown by Figure 4, was profitable.

An example of acid treatment on settled production is shown by Figure 5, where well "D," producing only five barrels of

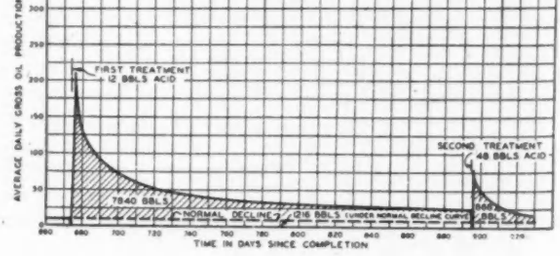
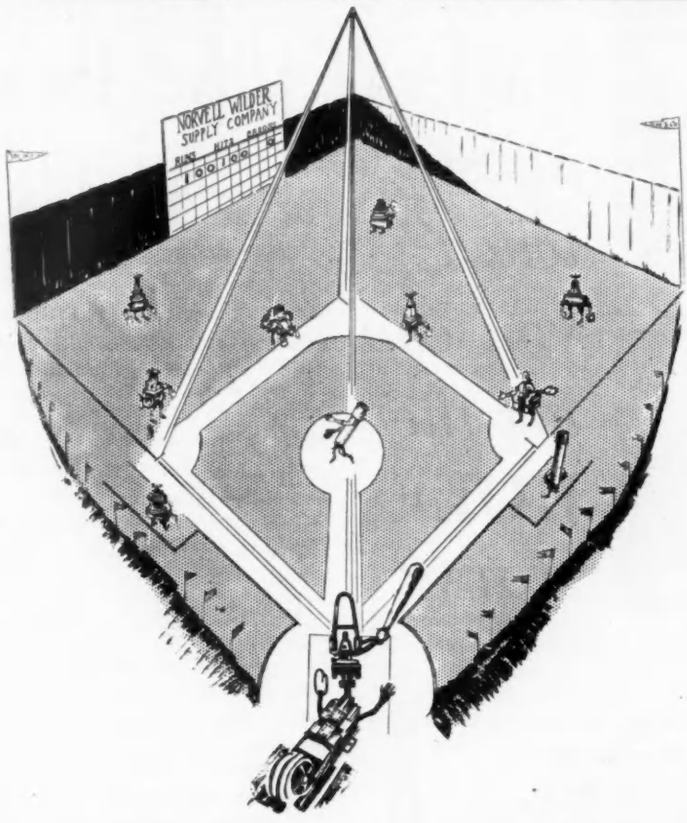

FIRST TREATMENT 12 BBLS ACID
SECOND TREATMENT 48 BBLS ACID
7840 BBLS
NORMAL DECLINE
AVERAGE DAILY GROSS OIL PRODUCTION, IN BARRELS
TIME IN DAYS SINCE COMPLETION

FIGURE 5

Effect of Acid Treatment on Settled Production, Well "D"—Producing Formation, Dundee Limestone

oil per day 660 days after completion, with the prospect of only 1,216 barrels for a nine months' period, was increased by the use of a 12-barrel and a 48-barrel acid treatment to produce about 8700 barrels more than could be reasonably esti-

NORVELL - WILDER TEAM PLAY EQUIPMENT



TEAM-PLAY SHUTS OUT GASSERS

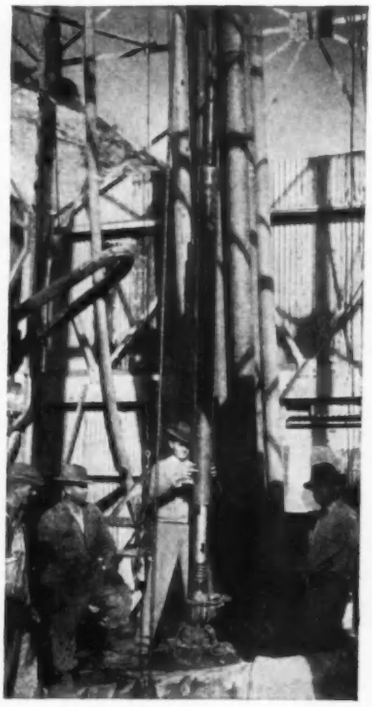
On the Derrick-floor Diamond

Whether the race is for the pennant on a baseball diamond, or to subdue high gas pressure and bring in a well without a hitch while drilling a mile or two miles deep, good men must not be handicapped with poor equipment.

When you supply your drilling crews from one of the Norvell-Wilder stores, you give them equipment that works perfectly with other equipment.

MORE MONEY IS MADE... time is saved . . . many of the hazards of drilling are eliminated . . . by using **NORVELL-WILDER TEAM-PLAY EQUIPMENT . . . call in that good oil field-idea scout—the NORVELL-WILDER MAN.**

Norvell-Wilder *Supply Company*



Why guess when you can get the HOLE *story?*

Why *take chances* . . . when the SURWEL Clinograph *takes pictures?* Pictures taken in the drill hole. Pictures that show if you're off the vertical . . . and show the actual direction of the deviation!

Straight holes *save* money. Crooked holes *cost* money. The SURWEL Clinograph will show you how to make these crooked holes . . . *go straight!*

Write for descriptive literature and rates.

Also makers of the SYFO Clinograph.

Sperry-Sun Well Surveying Co.
1608 Walnut Street, Philadelphia, Pa.

Dallas, Texas
1501 Munger Avenue

Tulsa, Oklahoma
402 Petroleum Building

Los Angeles, Calif.
415 Petroleum Securities Building

Tyler, Texas
Peoples Nat'l Bk. Bldg.

Bradford, Pa.
Hooker Fulton Bldg.

Houston, Texas
819 Esperson Building

Sectional view of a SURWEL Clinograph

***The* SURWEL Clinograph**

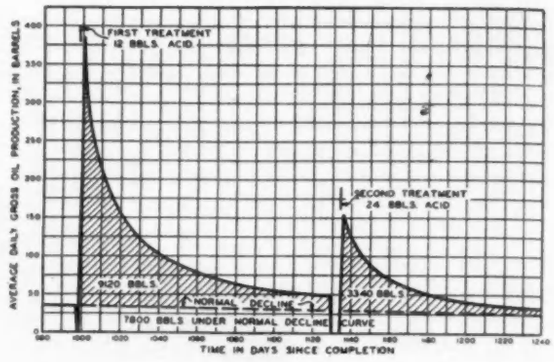


FIGURE 6

Effect of Acid Treatment on Settled Production, Well "E"—Producing Formation, Dundee Limestone

mated by the normal decline curve. Although this well had an initial of 420 barrels per day, the production might have declined in three more years to a point where it would not be economical to operate—necessitating the abandonment of the well without the recovery of oil as stimulated by acid treatment.

Another example illustrating the effect of acid treatment on settled production is shown by Figure 6 for well "E," which had an initial production of about 615 barrels per day, and was producing about 35 barrels per day almost three years after completion. A 12-barrel and 24-barrel acid treatment show an increase in accumulated production of 12,460 barrels over a period of eight months, and it is estimated that the well would have produced about 7800 barrels with its normal rate of decline. It is probable that wells of this type will respond to still further acid treatment.

Conclusions

1. Results show that it is advantageous to have analysis made of formations to be treated.

2. Work should be given experienced supervision, including both a technical and practical knowledge of the subject.

3. Amounts of acid for treatments can be approximated by the thickness and porosity of the formation and a consideration of results from previous practical experience.

4. The number of successive acid treatments that will yield profitable returns cannot be generally established.

5. Figure 2 to 6, inclusive, indicate a quick return on the cost of acid treatment, which means a higher early recovery of oil than would be expected without treatment; and in some cases production curves indicate that acid has opened up flow channels to lenses of porosity which might not otherwise have drained into the well.

Acknowledgments

Acknowledgment is due The Pure Oil Company for production data; R. B. Newcombe, Michigan Geological Survey; and the Dow Chemical Company, Midland, Michigan, for suggestions and comments.

Bibliography

[1]B. A. Cunningham, "Acid Treatment of Lime Formations," presented at spring meeting, Amer. Pet. Inst., Div. of Prod., Houston, Texas, April 7-8, 1933.

[2]R. B. Newcombe, "Acid Treatment for Increasing Oil Production," *Oil Weekly*, 69, no. 11, 19 (1933.)

[3]N. A. Best, "Treating Limestone Formation," etc., *Oil Gas J.*, 32 no. 46, 54 (1934.)

Care and Operation of

Small Gas Wells East of the Mississippi River

J. H. NEWLON
Equitable Gas Company
Pittsburgh, Pa.

THE natural gas fields of the Eastern United States lie almost entirely in the Great Appalachian basin or what is generally known as the Appalachian Geosyncline, a bowl shaped or trough-like depression paralleling the Appalachian Mountains on the west, with its axis extending in a northeast and southwest direction from New York state through western Pennsylvania and West Virginia, eastern Kentucky, Tennessee and northern Alabama. (The general location of this basin or field is shown on Figure 1.) The axis of this great basin reaches its lowest structural point at Wileyville in Wetzel County, West Virginia, at which point the Pittsburgh Coal is about sea level, which is 1300 feet lower than the Pittsburgh Coal at the City of Pittsburgh. From this lowest structural point, the various horizons rise in all directions toward the rim of the bowl, forming what is commonly termed the "major folds," the extremity of which is northern New York, central Pennsylvania, eastern West Virginia, Tennessee, northern Alabama, central Kentucky and Ohio. However, the continuity of these folds is interrupted at various points by abnormal rises and dips in the structure termed minor folds and better known as anticlines, synclines, domes, etc. On these minor folds have occurred the largest and longest lived gas fields of the East.

The occurrence and production of gas in the Appalachian field differs from that of most fields in that there are so many different producing horizons, which occur at varying places on the geological structure column. More than 50 horizons produce gas in a geological column less than 7000 feet thick. Structure plays a very great and important part in finding and developing a gas pool in the Eastern fields. The lack of knowledge or utter disregard of structural conditions in the Appalachian field has probably had more to do with conditions that cause small gas wells than any other one thing.

The accepted theory is that the series of shales, sandstones, clays, coals and limestones which go to make up the rocks of the Appalachian oil and gas fields were laid down in an inland sea during a period of the earth's earliest geological history and following a geological period of many millions of years the mass of sediment formed during this time was gently folded, and as the weight of the over-burden increased, the folds (or anticlines and synclines) increased. Due to this compression and folding, the gas and oil formed in the rocks, and the accompanying salt water, began to accumulate and take their respective positions in the more suitable porous parts of the sandstone horizons into which they had migrated. Therefore, the very nature of the formation of the Appalachian fields should have been a warning of some of the problems which could be expected.

Now, if ever, is the time for the natural gas industry to develop its potential efficiency to the maximum. Some one has said that man is normally about 40 percent efficient, but let something happen to any one of his senses, and the other senses will become more keen. In other words, a blind man develops his sense of hearing and touch almost to the maximum. Could not this truth be applied to the natural gas industry? Although it has been about 100 years since the Great Appalachian basin gave birth to the natural gas industry, it has only been during the past few years that any thought has been given to the development of a

THE importance and necessity for a systematic study of all well data together with general field conditions should be emphasized. From such a study, knowledge of all the existing factors that cause small gas wells may be summed up, and an intelligent, efficient and economical plan of maintenance and operation mapped out.

The producing areas of the present gas fields of the Appalachian Geosyncline are now quite definitely outlined and the fields have been thoroughly drilled up, the best that can be expected from any new drilling being nothing better than wells of small volume and low rock pressure, although it is very probable that some scattered gas fields of high volume and rock pressure (such as the recent Tioga County gas field in Pennsylvania) will be developed from time to time, but these will only act as a "temporary spurt" and cannot be depended upon to uphold production. Consequently, the "small gas wells" are the foundation upon which the future of the natural gas industry in Eastern United States must be depended and if taken care of properly, these small gas wells will produce an abundance of gas for some years to come.

There is no question but that the time, money and effort put into a well-studied "cleaning out and bailing out campaign" on the present small gas wells, will considerably increase their daily delivery capacity. In fact the cleaning out and bailing out of small wells by one of the larger operating gas companies in the Appalachian field during the past four years, has resulted in an increase in daily open flow volume of 297 percent per well through their cleaning out work, and an increase of 133 percent through their bailing out work, and when it is considered that this increase in daily open flow volume costs much less than that obtained by the drilling of new wells, it certainly seems that "care and nursing of small gas wells east of the Mississippi River" deserves serious thought and action at this time.

This paper was presented at the Mid-Year Meeting American Petroleum Institute, Pittsburgh, May 22-24, 1934.

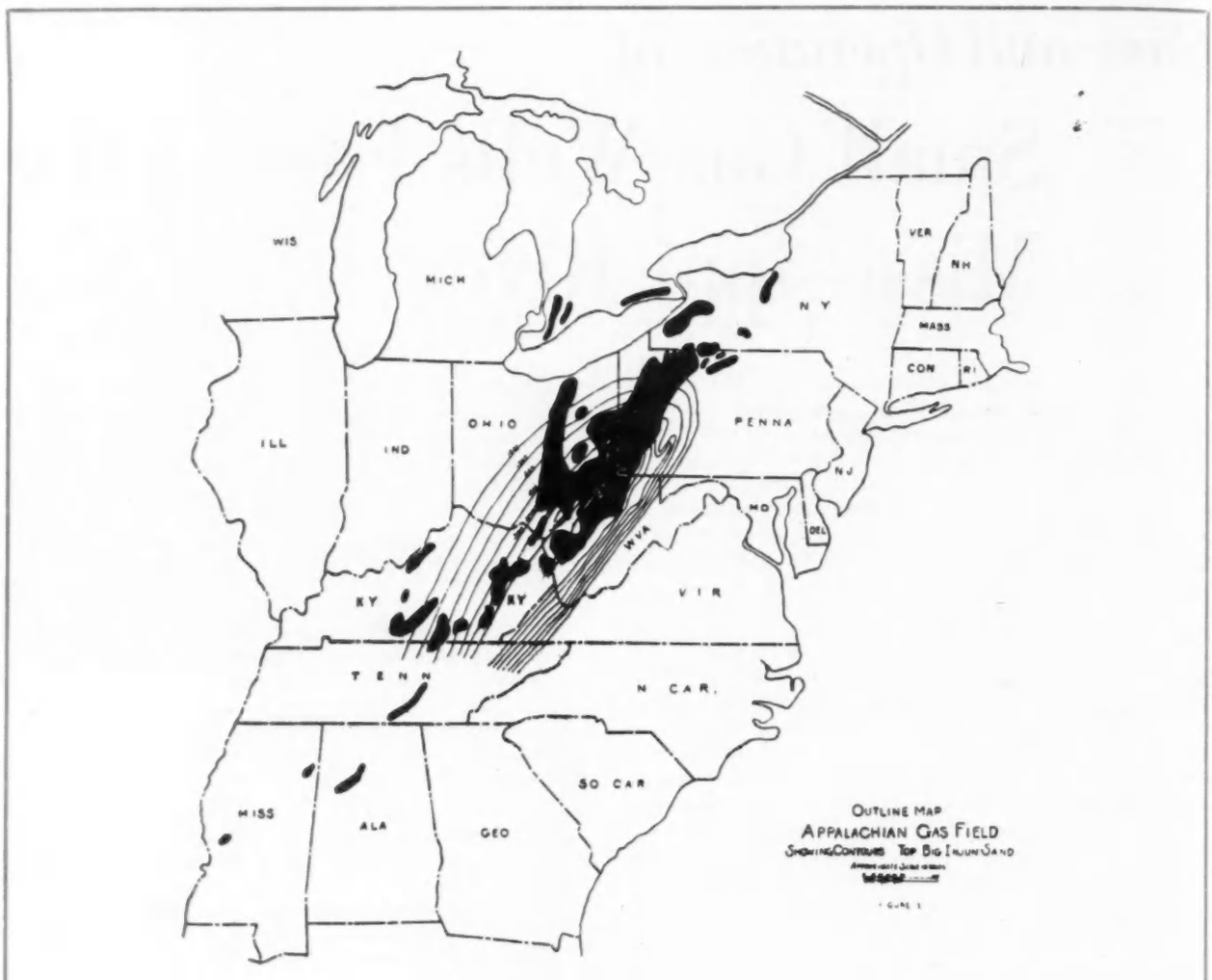


FIGURE 1

new gas pool and its ultimate future care, the reason being the lack of development beyond an efficiency of 40 percent. The natural gas industry's satisfied condition was probably due to the ever increasing demand for natural gas; the continued search for and discovery of new and greater fields; the inactivity of competitive fuels; and the general prosperity of the entire country. These conditions reached their peak in 1929 and since then the business has had an almost complete reversal of the picture due to the decreased demand for natural gas; the general depressed condition of business; the increased and concentrated drive made by competitive fuels and the continued increase in taxes (to the detriment of the consumer); the small average daily open flow developed from new drilling and the increased cost of developing and maintaining the properties.

Those who are familiar with the natural gas industry appreciate the fact that no one, notwithstanding their experience or competence, can say or substantiate an opinion as to the exact amount of gas that will be developed from the drilling of a new well, or the cleaning out or repairing of an old well, or from any group or number of wells. If the foregoing statements were not true, the natural gas industry would have no more difficulties in operating than the ordinary mill or power plant, where officials know before ground is broken for the erection of the plant, its total cost and capacity in tons of finished iron or steel or kilowatt hours of current. If more steel or current is needed, another unit must be added.

It would be difficult to discuss the care and operation of small gas wells without discussing some of the conditions encountered in drilling, finishing and final operation. It is recognized that conditions differ in various parts of the Appalachian field and that practices applicable to one section are not always applicable to another. Experience has taught that no matter how small the area to be developed, no set rule or formula can be used for the drilling, finishing, operating or maintaining of the wells drilled. In other words, the drilling and operation of each new well is a new and separate problem.

Producing and Non-Producing Formations Drilled Through

The producing formations drilled through in the Appalachian field are unconsolidated sandstones, separated by shales, coals, limestones and conglomerates. The gas production from these unconsolidated sands is usually obtained from a series of "pays" in the same formation, being separated only by thin layers of shale, generally called "a break." In some sections 20 or more of these gas producing formations occur in less than 3500 feet of structure, but only on rare occasions are there more than seven pro-

ducing formations in any one well but most of the time two to three.

The producing formations are comparatively thin, with an average porosity of 12 to 15 percent, and a great number of these beds when penetrated begin to cave and especially so if allowed to come in contact with water or oil. Therefore, since a great number of the oil and gas producing formations, including the separating beds, are water bearing, the problem of separating one from the other taxes one's ingenuity.

At the beginning of the present year, there was a grand total of approximately 50,000 producing gas wells in the Appalachian field, ranging in age from one to 50 years, the average age being about 14 years. Based on 1932 production figures, these 50,000 gas wells produced, in 1933, a grand total of 265 billion cubic feet of gas, or an average of 14½ M.C.F. per day, not including casinghead gas. And 35,000 (or 70 percent) of these wells should be classed as small gas wells. Their average daily delivery ranges from 3½ to 15 M.C.F. per day. The remaining 15,000 wells (or 30 percent) will average from 20 to 40 M.C.F. delivery per day.

These figures disclose the fact that the gas delivered by these small wells account for more than 50 percent of the total 1933 delivery of all gas wells in the Eastern fields. Therefore, it is evident that these "small" wells are the backbone of the industry, the production from which forms the base-lead necessary to be available 365 days of the year. If these statements are accepted as true, then what branch of the industry should have more thought, study and action in order that these small wells may be conserved and thus assure the survival of the industry in the future? No attempt has been made to estimate the amount of gas a well should deliver into the line necessary to pay its carrying charges. There is, of course, an economic limit or point in the life of a well when it is no longer profitable to operate. But there are some conditions of a variable nature which make it necessary to consider each well as a separate problem, such as delivery capacity, annual royalty, maintenance cost and proximity to market.

Some Reasons Which Make Gas Wells Small Producers

At the present time there are a great number of wells which are small due to having been improperly finished. In other words, having found a small amount of gas production in the upper sand, the drilling was continued through all known productive formations in that particular area, with the result that gas was found in some of the lower formations, and in an attempt to save all the gases discovered, the packer was set in the hole above the upper gas pay thus leaving several hundred feet of open hole below the packer, and this great amount of open hole resulted in the production being retarded by cavings, water, oil seepages, etc.

Also, in a great number of cases, the casing is set way up in the hole and drilling continued to the lower formations where production was found, and then with a view of economizing by not running any more casing or tubing, the gas is produced through the casing with the result that the open hole below the bottom of the casing caves in from water or oil seepages and retards production.

It is the general opinion of those in the industry that

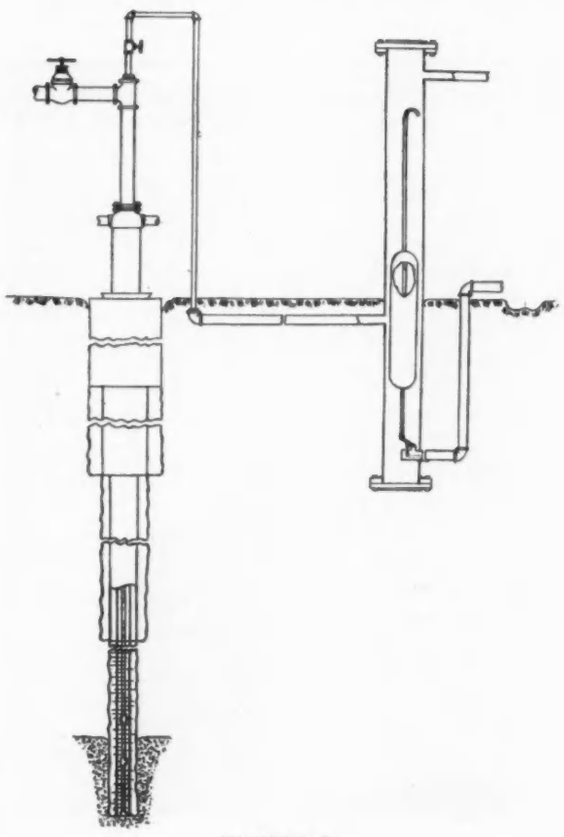


FIGURE 2
Continuous siphon installation

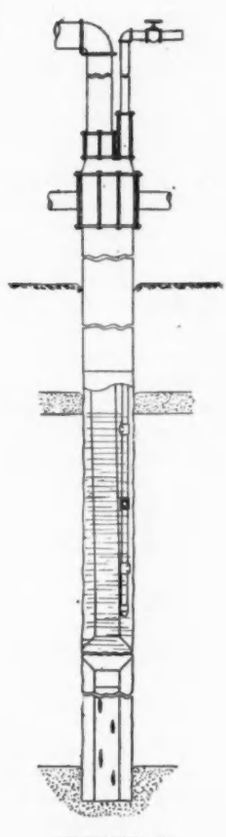


FIGURE 3
Intermittent siphon installation

the original daily delivery and the potential life of a great number of individual wells, and in some cases entire pools have been greatly reduced by being allowed to produce at too low pressures at the face of the sand. Wells of large open flow and high rock pressure increase their velocity in flow through the sand as the back pressure is decreased. If there is fluid in the sand, its natural position would be at the bottom of the "pay," and when the velocity of the gas through the sand reaches a point sufficient to set the water in motion, a certain amount of water will be picked up and carried into the producing string, and due to the decrease in the velocity of the gas as it approaches the top of the hole, caused by friction in the producing string and the increased weight of the column of gas on acount of the water carried in suspension, a certain amount of water falls back to the bottom of the hole and soon covers the face of the sand, and sooner or later, retards the flow or completely drowns out the gas. It is also believed that other serious conditions are caused by too low pressures in or at the face of the pay sand, i.e. that of the partial or total collapsing of the sand caused by a sudden drop in pressure or the continuance of low pressures on a sand that has a shut-in pressure of 600 to 800 pounds. Also, water seepage and cavings from unprotected formations above are more likely to start.

Up until recent years, it was the custom to use two-inch tubing almost exclusively in all gas wells. It has now been found that when a well's production is retarded by water, oil, or cavings, it is almost impossible to clean out such wells through this small size tubing. It then becomes necessary to move in a large cleaning out machine and pull the tubing and packer in order to clean out. In a number of cases this is a very difficult job for the reason that when the small string of tubing begins to deteriorate, it is generally caused by corrosion which starts at the top or point where the cavings, oil and water rise and settle. Invariably when pulling on the packer the tubing parts at this point and it becomes a very expensive cleaning out jub, in fact necessitating at times the plugging of the well.

Maintenance of Small Gas Wells

The following are some of the difficulties to be overcome in the maintenance of small gas wells:

Accumulation of salt water and the subsequent salting of the face of the sand and the tubing.
Accumulation of paraffin.
Cavings from upper sands, shales and clays.
Leakage from poorly set casing strings and packers.
Faulty strings of tubing.

The following are some of the methods in use at the present time to overcome the difficulties in maintenance mentioned above, together with a detailed statement on each method:

Holding proper back pressure.
Swabbing by hand or machine.
Bailing out.
Pumping.
Siphoning.
Shooting.
Cleaning out, re-casing and re-tubing.

Holding Proper Back Pressure

By holding proper back pressure on the producing sand, the differential pressure drop in and at the face of the sand is reduced, which retards the flow of salt water, and thereby minimizes the salting and clogging of the face of the sand, and the tubing string and also the collapse of the sand.

Swabbing

Hand swabbing is a very effective and economical method of removing water or oil from gas wells, and especially so where there is enough rock pressure to assist in lifting the water column out of the hole. The equipment for hand swabbing consists in a small table-like frame on which is mounted a reel with sufficient wire line to reach the bottom of the hole, and ordinary swab being attached to the end of the wire line. The reel is equipped with a crank handle on each side for manual operation by two men. The hand-swab is generally used on isolated wells where it would be difficult to transport the larger type machines.

Bailing or Swabbing out Machine

There are so many and varied types of bailing or swabbing machines that no attempt will be made here to describe any particular one, any more than to state that this method is much faster and less burdensome than the hand swab.

Pumping

The unit pumping method is used to great advantage in cases where it is necessary to bail or swab out a well a great number of times each year, being used particularly on old wells where the rock pressure is not sufficient to assist in raising the water column in the hole, and it has a number of advantages over the bailing out method, such as:

(1) No gas is wasted while the fluid is being removed.
(2) The level of the fluid can be kept below the producing sand (this not only keeps the sand from "mudding-up" but also helps the well to produce its full capacity at all times).
(3) The well is not inclined to cave as readily when pumped as it is when bailed.
(4) Salt bridges are not so liable to form because the level of the water is at all times below the "gas

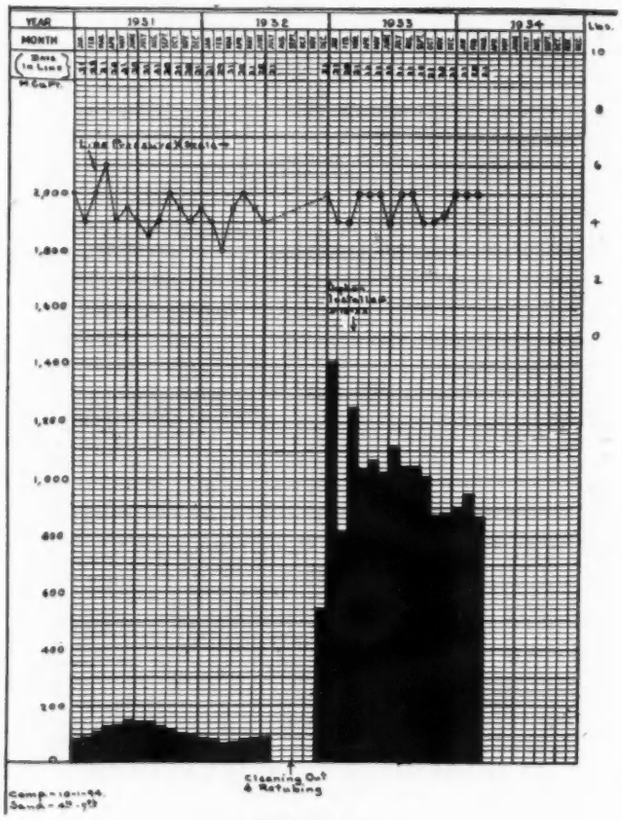


FIGURE 4
Comparison of metered production before and after siphon installation

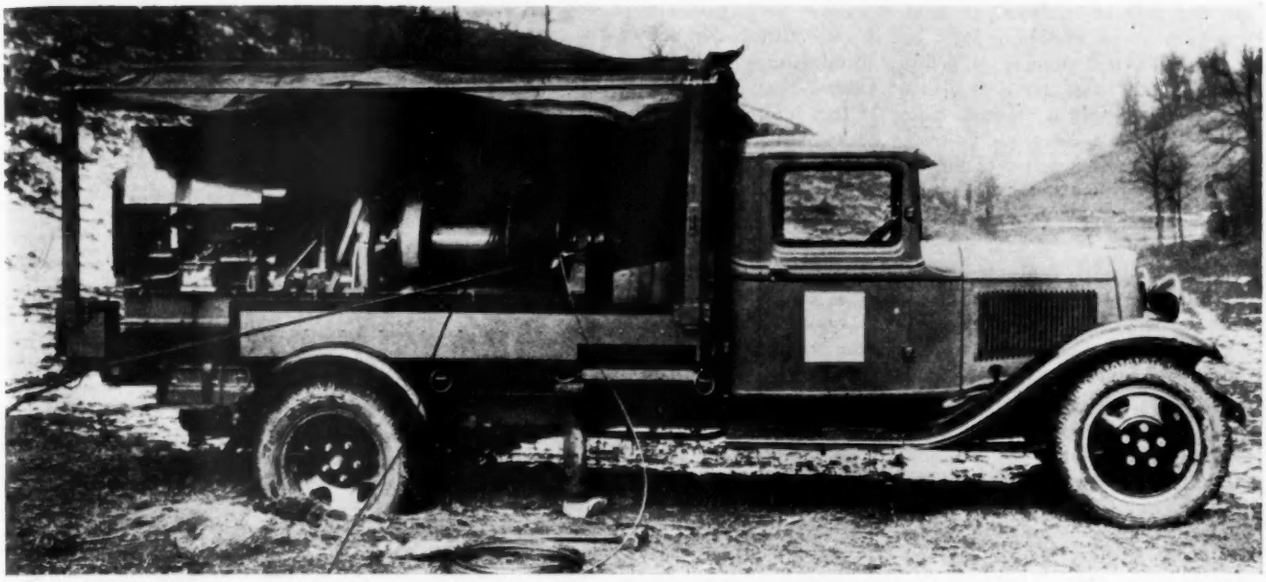


FIGURE 5
Bailing out and cleaning out unit mounted on 1½-ton truck

pay," and is thus kept from being sprayed into the "walls" of the hole.

The initial cost (together with the carrying charges on investment) of completely equipping a gas well for pumping (it being necessary to equip each well due to the spacing between wells) is, of course, much greater than the cost of keeping a well bailed out by the ordinary methods, but at the present time, experiments are being conducted with the thought of developing a portable machine and jack, to be used where the well is more accessible and such equipment will probably reduce the pumping cost materially in certain cases.

That the pumping method has proven of aid in maintaining the production of old wells, is shown by the fact that one company which has a field with 222 wells, has 186 of these wells equipped for pumping. This is probably one of the oldest gas fields in the world and the wells in it have an average life of more than 30 years.

Siphons

There are two methods used in the siphoning of water off gas wells. The continuous siphon, Figure 2, is an installation whereby the water and gas are taken out through a three quarter-inch to one-inch string, and the water separated from the gas by an automatic separator. This is one of the most economical outfits for the removal of water from gas wells, but will work only under certain conditions. In other words, the rock pressure and volume must be sufficient to eject the water, with enough reserve pressure to deliver against varying line pressures. The intermittant siphon installation, Figure 3, is a small string of three quarter-inch or one-inch tubing installed inside the producing string and at regular intervals the producing string is shut in, and a back pressure allowed to build up to a pressure sufficient to lift the water out through the small string of tubing. The well is then turned back in line and produced until the water again reaches the danger point. Figure 4 shows a comparison of the metered production before and after an actual installation of a continuous siphon.

In a well where the face of the sand becomes clogged with salt, paraffin, or cavings, and it is found that this cannot be removed by water or gasoline, it is then necessary to move in the regular cleaning out machine, pull the tubing, and clean out in the ordinary manner, and there are also times when the face of the sand can be opened up by shooting with a small shot of dynamite, glycerine, or gelatin.

Recommendation as to Best Methods of Maintaining Small Wells

Minimum Size Tubing and Casing—Slotted Perforation

Upon the completions of any new gas well, if it is worth keeping, it is certainly well worth while to give serious thought and study as to the best method to be used in casing and tubing same so as to prevent any serious future trouble from water, oil, or cavings. If possible, the producing string should consist in casing of not less than 5 3/16-inch, but in cases where it is found that tubing is absolutely necessary, then nothing smaller than three-inch tubing should be used (in fact any time it is found necessary to pull the old two-inch tubing it should be replaced with three-inch tubing in all cases) and when such tubing is used, the perforated joint should be perforated by horizontal slots one half-inch by five inches to six inches long. It has been found that this type of perforation offers much less resistance to the flow of gas and is also much less likely to become clogged with cavings or become salted up, than the type generally in use consisting in a number of small round holes in the perforated joint.

Bailing Outfit

The old time slow and expensive horse-drawn bailing out oufit has about completely passed out of the picture, except in certain isolated districts, and its place has been taken by the more economical and up-to-date motorized bailing machine which, on account of the present splendid network of good roads, can be moved more quickly from place to place and the job completed in a more efficient and economical manner.

The most efficient equipment for this bailing out work, Figure 5, consists in a gasoline motored bailing out and cleaning out low geared unit mounted on a 1½-ton dual tired motor truck, capable of a road speed up to 50 miles per hour, the truck being geared low enough to carry its own load up most any grade, but where the grade is too great, the bailing out unit motor and winch can be used to assist the truck in negotiating such a grade. This bail-

ing out unit is equipped so that it cannot only perform bailing out and swabbing jobs, but is very efficient in the necessary small amount of drilling usually accompanying cleaning out jobs and it is also so geared that in bailing out jobs, carrying a 4½-inch bailer 25 feet long, it will go in and out of a 2000-foot hole and dump in four minutes. These machines are also equipped with the necessary small tools to clean out in the two-inch and three-inch tubing and 5 3/16-inch and six-inch casing.

It is recommended that in all cases of bailing out jobs, and especially in "suspected" cleaning out jobs, a portable machine of this type should be moved in and if it is found that the work cannot be done with this machine, then one need not worry about making a mistake by moving in the larger and more expensive type of cleaning out machine.

Of course, the tractor type of swabbing and bailing out machine will be found more practical in certain places and especially where the wells are more or less in bad locations but, of course, for long moves, this type would not be practical for an extensive bailing out campaign.

Siphon

Where conditions are found to be favorable after sufficient study has been made, the installation of a siphon will be found to be more economical.

Unit Pump

While the unit pumping method has its use in some exceptional cases, it will not be found to be practical in all fields, and as a matter of fact, one of the major operating companies in the Appalachian field has been enabled to take care of its maintenance work on almost 2000 gas wells, with a fleet of eight portable motorized bailing out machines of the type mentioned above.

Swabbing

Swabbing is probably the quickets way to eliminate water from a gas well and is practical and advisable under certain conditions; that is, where the gas well is properly cased and tubed so that the swabbing will not pull in cavings from formations already in a cavey condition or start other formations to caving.

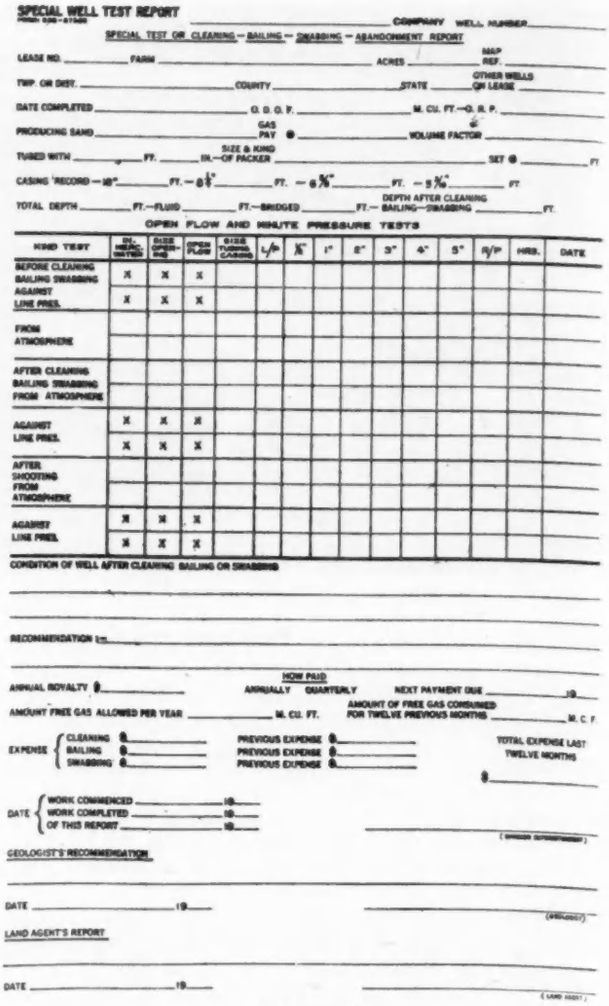
Recently, a combination swabbing outfit has been developed which would take care of any size tubing from two-inch to four-inch by interchangeable rubbers; in other words, such a swab will eliminate the necessity for carrying two or three extra swab outfits.

Methods of Deciding Which Wells Should Be Cleaned Out, Bailed Out, Etc.

Probably one of the most important features in the maintenance of a gas well property is the detection of "sick" wells at the proper time, the proper diagnosing of the case, and the prescribing of the proper remedy, together with the setting aside of a suitable amount in the annual budget for such work.

In the detection of these sick wells, such items as the monthly minute pressures, above line, taken from one to five minutes and the rock pressure tests are important, inasmuch as they give prior warning to the well tender that something is wrong, and after conference between the well tender, foreman and the superintendent, a recommendation is made to the main office, giving all facts regarding the case with a recommendation as to what should be done in each particular case. Of course, in order to make such a plan workable, it is necessary that a special form or forms for the various field men's reports and recommendations be put into use, and Figure 6—is a sample of form in use by one of the major Appalachian field operating companies for this purpose. [Also illustrated was a monthly well condition report.]

After a proper study in the main office of these field


SPECIAL WELL TEST REPORT

COMPANY WELL NUMBER

SPECIAL TEST OR CLEANING — BAILING — SWABBING — ABANDONMENT REPORT

LEASE NO. FARM ACRES MAP REF.

TWP. OR DIST. COUNTY STATE OTHER WELLS ON LEASE

DATE COMPLETED G. O. G. P. M. CU. FT.—O. R. P.

PRODUCING SAND GAS PAY VOLUME FACTOR

TUBED WITH FT. SIZE & KIND OF PACKER SET @ FT.

CASING RECORD — 10" FT. — 8¼" FT. — 6⅝" FT. — 5⅜" FT.

TOTAL DEPTH FT.—FLUID FT.—BRIDGED FT.— DEPTH AFTER CLEANING BAILING—SWABBING FT.

OPEN FLOW AND MINUTE PRESSURE TESTS

KIND TEST	DIA. HOLE UNDER	SIZE CASING	OPEN FLOW	SIZE TUBING CASING	¼"	½"	1"	2"	3"	4"	5"	6"P	HRS.	DATE
BEFORE CLEANING BAILING SWABBING AGAINST LINE PRES.	X	X	X											
	X	X	X											
FROM ATMOSPHERE														
AFTER CLEANING BAILING SWABBING FROM ATMOSPHERE														
AGAINST LINE PRES.	X	X	X											
	X	X	X											
AFTER SHOOTING FROM ATMOSPHERE														
AGAINST LINE PRES.	X	X	X											
	X	X	X											

CONDITION OF WELL AFTER CLEANING BAILING OR SWABBING

RECOMMENDATION

ANNUAL ROYALTY $ HOW PAID ANNUALLY QUARTERLY NEXT PAYMENT DUE 19

AMOUNT FREE GAS ALLOWED PER YEAR M. CU. FT. AMOUNT OF FREE GAS CONSUMED FOR TWELVE PREVIOUS MONTHS M. C. F.

EXPENSE CLEANING $ BAILING $ SWABBING $ PREVIOUS EXPENSE $ PREVIOUS EXPENSE $ PREVIOUS EXPENSE $ TOTAL EXPENSE LAST TWELVE MONTHS $

DATE WORK COMMENCED 19 WORK COMPLETED 19 OF THIS REPORT 19

GEOLOGIST'S RECOMMENDATION

DATE 19 (SIGNED)

LAND AGENT'S REPORT

DATE 19 (LAND AGENT)

FIGURE 6

reports, together with all the past available history of each well is made and it is decided that a well should be cleaned out in order to put it back on a producing basis, such a well is then placed on the "cleaning out list," a copy of which is furnished the field superintendent. Then, after the work of cleaning out has been completed, a special test is again taken and decision made as to whether or not it should be continued as an active well at the present royalty, or at a reduced royalty or abandoned and plugged. While this procedure takes some time, nevertheless when it is considered that a company may have an investment of from $12,000 to $15,000 at stake in each well, it is certainly worth a little time and expense to get sufficient information to protect such capital investment.

In order to inaugurate such a maintenance plan as outlined herein, the most important feature which will make for its success or failure, is the impressing on the mind of each individual field well tender, the importance of his position—that he has a property whose value, in most cases, will amount to nearly a half million dollars, under his care and for which he is individually responsible. If he is the man for the job, he will then insist on all wells which he takes care of, produce to their maximum, and if not, he will see that such steps as are necessary to put his wells in good condition are taken by the proper authorities, and if he does not take such an attitude, he certainly is not the proper man for the job and should be replaced.

Care and Operation of

Small Oil Wells East of the Mississippi

HERMAN L. LITTLE
South Penn Oil Company
Pittsburgh, Pa.

THE present economic conditions in the Appalachian area for the production of oil from properties that have grown old in operation are such that they are requiring extreme care, nursing and study for practically every area from New York state to Kentucky. Problems dealing with the replacement of material for maintenance of well, utilization of labor and methods of production to pursue, for the continued economical lives of many properties are manifold. Practically all properties have characteristics peculiarly their own and require an individual operating study based on the mindful slogan "It can be done, but will it pay." In this short paper it is the intention to indicate a few operations with respect to the nursing of small wells that can be done and will pay in many places when properly applied.

In the Eastern fields with wells of long life, the replacement of worn out equipment is necessary and almost always a heavy burden. South of the Butler field many wells are still equipped with wooden rigs that have fallen to decay, and there is little desirable cheap timber at hand for replacement. Early iron rigs are also in need of replacement, and as a result, there has been a concerted effort to build a more permanent rig setup, and a general transition is taking place in the fabrication of physical equipment by the use of salvaged pipe.

Replacements of rigs have received considerable study. The present trend is toward an outfit made of materials with greater resistance to erosion and corrosion. Permanent rig setup is the objective in mind. Much greater care in the aligning of equipment is now exercised. In fact the conception concerning new rigs is a power plant installation with blue print specifications for erection. The consequence of such care in planning and installation of replacements has resulted in expediting well operations, considerable decrease in loss of time for adjustments and minor repairs, better power transmission and safety with satisfaction for workman, with materials having much longer utility and stability. Concrete foundations for engine, jack posts, sampson posts, sand reels and derrick legs are now being used. Steel pipe is fashioned into walking beams, jack posts and sampson posts. This pipe is material salvaged from field operations that have been abandoned. The sizes and weights of pipe used vary from four-inch, 10-pound to eight-inch, 24-pound. Steel bull wheels are being generally used. The use of these materials has made a marked improvement in the life of the rig equipment and a desirable decrease in subsequent replacement costs and accidents to workmen.

Line Heating

Equipment for the heating of oil for pipe line runs is receiving more careful attention where supplies of gas are dwindling. There are three kinds of heaters of the direct heating type that are proving useful and economical. First, there is the copper coil type of direct heating equipment designed and installed on the plan of the domestic water heating type. Another type is patterned after the horizontal return tubular boiler made from salvaged pipe of eight or 10-inch diameter by welding methods. This type involves the welding of one-inch flues in a piece of 10-inch pipe about four feet long. The unit is then set on brick foundation similar to a return tubular boiler. Connection lines from storage tank to heater and return are constructed a short distance from storage tank. In the steel oil run tank a direct oil heater of the flue type has been used with satisfaction and economy. This type simply involves a piece of three- or four-inch pipe permanently welded in the tank, running from a point on the circumference on the tank six to eight inches from the bottom and parallel with the same, across the diameter of the tank to within a foot of the side wall of the tank. A 90-degree weld is used to extend this flue vertically through the roof and parallel with the side wall of tank. The heat from a small gas flame courses through this flue with a satisfactory heat exchange. In all oil heating operations the handling of the crude oil before running the oil to the storage tank is extremely important. The syphon type oil-water separator on the derrick floor is practically indispensable,

IN the Appalachian area, the care and operation of the small wells have demanded a studious survey of replacements from more durable materials. Oil heating conditons for pipe line runs are receiving greater attention because of dwindling gas supply. Oil well pumping conditions are more carefully analyzed by operators to get greater efficiency into pumping schedule. Regular cleaning out routine with tools augmented with carbide and water treatment is being practiced. Badly caving shot holes are profitably repaired by use of gravel. Pressure drive operations with gas or air-gas mixtures are recommended, affording transition from vacuum producing operations to positive pressure on casinghead gas gathering systems. Pressure holes that have been nonproductive are now serving as gas reservoirs for summer surplus of gas to take care of winter needs. Acid treatment of lime formation wells worth while. Unit operation of small adjacent properties under pressure drive operation recommended for small individual owners. Recommendations herewith given have been tried and proved to be profitable.

This paper was read before the Mid-Year Meeting of the American Petroleum Institute, Pittsburgh, May 22-24, 1934.

ing out unit is equipped so that it cannot only perform bailing out and swabbing jobs, but is very efficient in the necessary small amount of drilling usually accompanying cleaning out jobs and it is also so geared that in bailing out jobs, carrying a 4½-inch bailer 25 feet long, it will go in and out of a 2000-foot hole and dump in four minutes. These machines are also equipped with the necessary small tools to clean out in the two-inch and three-inch tubing and 5 3/16-inch and six-inch casing.

It is recommended that in all cases of bailing out jobs, and especially in "suspected" cleaning out jobs, a portable machine of this type should be moved in and if it is found that the work cannot be done with this machine, then one need not worry about making a mistake by moving in the larger and more expensive type of cleaning out machine.

Of course, the tractor type of swabbing and bailing out machine will be found more practical in certain places and especially where the wells are more or less in bad locations but, of course, for long moves, this type would not be practical for an extensive bailing out campaign.

Siphon

Where conditions are found to be favorable after sufficient study has been made, the installation of a siphon will be found to be more economical.

Unit Pump

While the unit pumping method has its use in some exceptional cases, it will not be found to be practical in all fields, and as a matter of fact, one of the major operating companies in the Appalachian field has been enabled to take care of its maintenance work on almost 2000 gas wells, with a fleet of eight portable motorized bailing out machines of the type mentioned above.

Swabbing

Swabbing is probably the quickets way to eliminate water from a gas well and is practical and advisable under certain conditions; that is, where the gas well is properly cased and tubed so that the swabbing will not pull in cavings from formations already in a cavey condition or start other formations to caving.

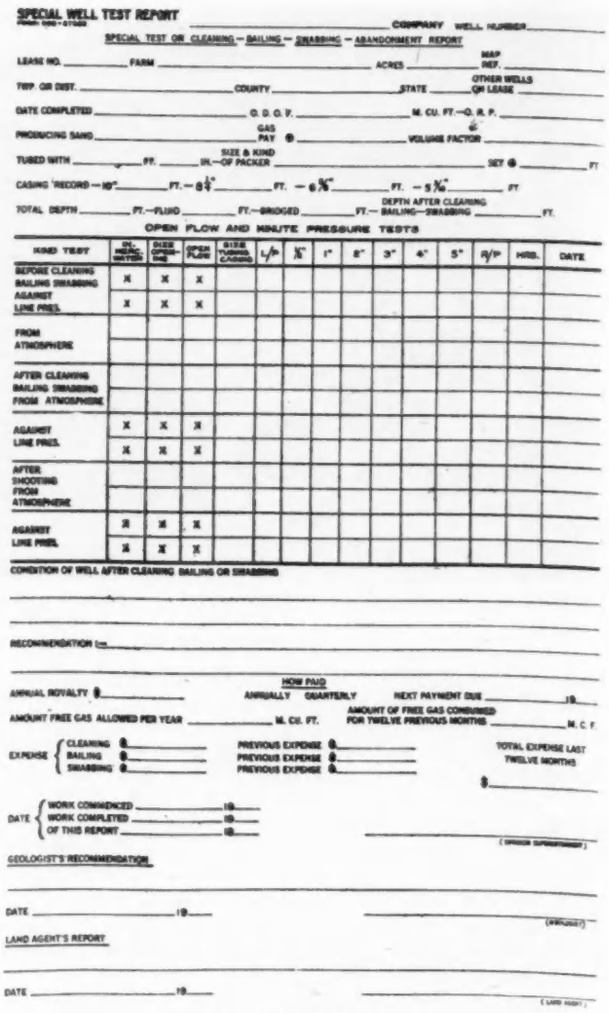
Recently, a combination swabbing outfit has been developed which would take care of any size tubing from two-inch to four-inch by interchangeable rubbers; in other words, such a swab will eliminate the necessity for carrying two or three extra swab outfits.

Methods of Deciding Which Wells Should Be Cleaned Out, Bailed Out, Etc.

Probably one of the most important features in the maintenance of a gas well property is the detection of "sick" wells at the proper time, the proper diagnosing of the case, and the prescribing of the proper remedy, together with the setting aside of a suitable amount in the annual budget for such work.

In the detection of these sick wells, such items as the monthly minute pressures, above line, taken from one to five minutes and the rock pressure tests are important, inasmuch as they give prior warning to the well tender that something is wrong, and after conference between the well tender, foreman and the superintendent, a recommendation is made to the main office, giving all facts regarding the case with a recommendation as to what should be done in each particular case. Of course, in order to make such a plan workable, it is necessary that a special form or forms for the various field men's reports and recommendations be put into use, and Figure 6—is a sample of form in use by one of the major Appalachian field operating companies for this purpose. [Also illustrated was a monthly well condition report.]

After a proper study in the main office of these field


SPECIAL WELL TEST REPORT _____ COMPANY WELL NUMBER _____

SPECIAL TEST OR CLEANING — BAILING — SWABBING — ABANDONMENT REPORT

LEASE NO. _____ FARM _____ ACRES _____ MAP REF. _____

TWP. OR DIST. _____ COUNTY _____ STATE _____ OTHER WELLS ON LEASE _____

DATE COMPLETED _____ G. O. G. P. _____ M. CU. FT.—G. R. P. _____

PRODUCING SAND _____ GAS PAY @ _____ VOLUME FACTOR _____

TUBED WITH _____ FT. SIZE & KIND OF PACKER _____ SET @ _____ FT

CASING 'RECORD — 10" _____ FT. — 8¼" _____ FT. — 6 5/16" _____ FT. — 5 3/16" _____ FT

TOTAL DEPTH _____ FT.—FLUID _____ FT.—BRIDGED _____ FT.— DEPTH AFTER CLEANING BAILING—SWABBING _____ FT.

OPEN FLOW AND MINUTE PRESSURE TESTS

KIND TEST	OIL, NEAR. SALTWATER	SIZE OPEN-ING	OPEN FLOW	SIZE TUBING CASING	¼"	½"	1"	2"	3"	4"	5"	R/P	HRS.	DATE
BEFORE CLEANING BAILING SWABBING AGAINST LINE PRES.	X	X	X											
	X	X	X											
FROM ATMOSPHERE														
AFTER CLEANING BAILING SWABBING FROM ATMOSPHERE														
AGAINST LINE PRES.	X	X	X											
	X	X	X											
AFTER SHOOTING FROM ATMOSPHERE														
AGAINST LINE PRES.	X	X	X											
	X	X	X											

CONDITION OF WELL AFTER CLEANING BAILING OR SWABBING

RECOMMENDATION _____

ANNUAL ROYALTY $_____ HOW PAID ANNUALLY QUARTERLY NEXT PAYMENT DUE _____ 19__

AMOUNT FREE GAS ALLOWED PER YEAR _____ M. CU. FT. AMOUNT OF FREE GAS CONSUMED FOR TWELVE PREVIOUS MONTHS _____ M. C. F.

EXPENSE { CLEANING $_____ BAILING $_____ SWABBING $_____ } PREVIOUS EXPENSE $_____ PREVIOUS EXPENSE $_____ PREVIOUS EXPENSE $_____ TOTAL EXPENSE LAST TWELVE MONTHS $_____

DATE { WORK COMMENCED _____ 19__ WORK COMPLETED _____ 19__ OF THIS REPORT _____ 19__ }

_____ (OPERATOR SUPERINTENDENT)

GEOLOGIST'S RECOMMENDATION _____

DATE _____ 19__ _____ (GEOLOGIST)

LAND AGENT'S REPORT _____

DATE _____ 19__ _____ (LAND AGENT)

FIGURE 6

reports, together with all the past available history of each well is made and it is decided that a well should be cleaned out in order to put it back on a producing basis, such a well is then placed on the "cleaning out list," a copy of which is furnished the field superintendent. Then, after the work of cleaning out has been completed, a special test is again taken and decision made as to whether or not it should be continued as an active well at the present royalty, or at a reduced royalty or abandoned and plugged. While this procedure takes some time, nevertheless when it is considered that a company may have an investment of from $12,000 to $15,000 at stake in each well, it is certainly worth a little time and expense to get sufficient information to protect such capital investment.

In order to inaugurate such a maintenance plan as outlined herein, the most important feature which will make for its success or failure, is the impressing on the mind of each individual field well tender, the importance of his position—that he has a property whose value, in most cases, will amount to nearly a half million dollars, under his care and for which he is individually responsible. If he is the man for the job, he will then insist on all wells which he takes care of, produce to their maximum, and if not, he will see that such steps as are necessary to put his wells in good condition are taken by the proper authorities, and if he does not take such an attitude, he certainly is not the proper man for the job and should be replaced.

Care and Operation of

Small Oil Wells East of the Mississippi

HERMAN A. LITTLE
South Penn Oil Company
Pittsburgh, Pa.

THE present economic conditions in the Appalachian area for the production of oil from properties that have grown old in operation are such that they are requiring extreme care, nursing and study for practically every area from New York state to Kentucky. Problems dealing with the replacement of material for maintenance of well, utilization of labor and methods of production to pursue, for the continued economical lives of many properties are manifold. Practically all properties have characteristics peculiarly their own and require an individual operating study based on the mindful slogan "It can be done, but will it pay." In this short paper it is the intention to indicate a few operations with respect to the nursing of small wells that can be done and will pay in many places when properly applied.

In the Eastern fields with wells of long life, the replacement of worn out equipment is necessary and almost always a heavy burden. South of the Butler field many wells are still equipped with wooden rigs that have fallen to decay, and there is little desirable cheap timber at hand for replacement. Early iron rigs are also in need of replacement, and as a result, there has been a concerted effort to build a more permanent rig setup, and a general transition is taking place in the fabrication of physical equipment by the use of salvaged pipe.

Replacements of rigs have received considerable study. The present trend is toward an outfit made of materials with greater resistance to erosion and corrosion. Permanent rig setup is the objective in mind. Much greater care in the aligning of equipment is now exercised. In fact the conception concerning new rigs is a power plant installation with blue print specifications for erection. The consequence of such care in planning and installation of replacements has resulted in expediting well operations, considerable decrease in loss of time for adjustments and minor repairs, better power transmission and safety with satisfaction for workman, with materials having much longer utility and stability. Concrete foundations for engine, jack posts, sampson posts, sand reels and derrick legs are now being used. Steel pipe is fashioned into walking beams, jack posts and sampson posts. This pipe is material salvaged from field operations that have been abandoned. The sizes and weights of pipe used vary from four-inch, 10-pound to eight-inch, 24-pound. Steel bull wheels are being generally used. The use of these materials has made a marked improvement in the life of the rig equipment and a desirable decrease in subsequent replacement costs and accidents to workmen.

Line Heating

Equipment for the heating of oil for pipe line runs is receiving more careful attention where supplies of gas are dwindling. There are three kinds of heaters of the direct heating type that are proving useful and economical. First, there is the copper coil type of direct heating equipment designed and installed on the plan of the domestic water heating type. Another type is patterned after the horizontal return tubular boiler made from salvaged pipe of eight or 10-inch diameter by welding methods. This type involves the welding of one-inch flues in a piece of 10-inch pipe about four feet long. The unit is then set on brick foundation similar to a return tubular boiler. Connection lines from storage tank to heater and return are constructed a short distance from storage tank. In the steel oil run tank a direct oil heater of the flue type has been used with satisfaction and economy. This type simply involves a piece of three- or four-inch pipe permanently welded in the tank, running from a point on the circumference on the tank six to eight inches from the bottom and parallel with the same, across the diameter of the tank to within a foot of the side wall of the tank. A 90-degree weld is used to extend this flue vertically through the roof and parallel with the side wall of tank. The heat from a small gas flame courses through this flue with a satisfactory heat exchange. In all oil heating operations the handling of the crude oil before running the oil to the storage tank is extremely important. The syphon type oil-water separator on the derrick floor is practically indispensable,

IN the Appalachian area, the care and operation of the small wells have demanded a studious survey of replacements from more durable materials. Oil heating conditons for pipe line runs are receiving greater attention because of dwindling gas supply. Oil well pumping conditions are more carefully analyzed by operators to get greater efficiency into pumping schedule. Regular cleaning out routine with tools augmented with carbide and water treatment is being practiced. Badly caving shot holes are profitably repaired by use of gravel. Pressure drive operations with gas or air-gas mixtures are recommended, affording transition from vacuum producing operations to positive pressure on casinghead gas gathering systems. Pressure holes that have been nonproductive are now serving as gas reservoirs for summer surplus of gas to take care of winter needs. Acid treatment of lime formation wells worth while. Unit operation of small adjacent properties under pressure drive operation recommended for small individual owners. Recommendations herewith given have been tried and proved to be profitable.

This paper was read before the Mid-Year Meeting of the American Petroleum Institute, Pittsburgh, May 22-24, 1934.

and its use, providing the removal of water and sediment from the oil, removes the majority of troubles encountered with direct oil heaters. Occasionally an oil is such that it must be heated by other methods, but usually the crude properly separated from foreign matter can be heated satisfactorily in one of these three types.

Pumping

A watchful survey of pumping conditions on all properties is considerably worth while. This is still the important operation that it always has been and must have constant supervision. Frequently many producers have been complacently satisfied with a regular pumping routine which has not been questioned for years. This attitude has been brought about by lack of trouble with the wells and no particular effort to learn the full pumping possibilities of the wells by varying the different factors affecting the recovery of oil. This particular feature on production does not receive the close attention that the best economical operation demands. A general ironclad rule cannot be given for all properties. However, from working experience in different locations, a careful study of the well elevations and drilling records with respect to pay sand contours is always of first and worth while importance. Subsequent field work to check the position of pumping equipment in each well with respect to pay sand and pocket is absolutely essential. This is followed by experiments to determine the proper depth for the pump, the pump being operated at various depths long enough to secure definite data on quality and volume of oil recoverable from the given depth. Under the old program the usual operation has been to pump two days a week for three hours in which time a well pumps off and makes, for example, three barrels of oil on each pumping, or six barrels. By undertaking a pumping operation three times a week, two hours each time, instead of the prolonged two time pumping, and gradually extending the time to possibly four times a week and a shorter pumping period of only one hour and a half each time, the result has not only been the recovery of the regular production of six barrels a week, but an additional four to five barrels more. The additional recovery has not resulted in every case where the pumping times were changed. It has occurred in so many cases that it is considered a worth while effort. This method of operation has resulted in considerably larger recoveries of oil from wells that are of low rock pressure, and of course, lack filling capacity due to fluid head pressures. Such increases as thus obtained have been maintained with no damage to the wells and practically no increase in cost because most of this kind of field work can be sandwiched in the regular pumping routine at odd periods if the field work is carefully planned and the force kept busy.

With the sustained decrease in the value of casinghead natural gasoline, there is a transition taking place on many properties where normal vacuum operations have been maintained. The vacuum conditions are being eliminated, thus saving the cost of one stage of compression in handling the casinghead gas. Many gas pumped properties still have good rock pressures existing in the oil sand. The producing oil wells are gradually being restored to atmospheric pressure conditions or higher, in keeping, of course, with the nature of the remaining sand characteristics. With this change there is a slackening of oil production temporarily, but eventually many properties have returned to normalcy, and in some instances, better than what was known as normalcy.

Regular Cleaning

Regular cleaning is of the greatest importance in the case of most wells. Intelligent planning of the cleaning out routine, backed with the idea of cleaning out regularly, has much to recommend it to the average producer. It is by means of this more frequent cleaning out routine that a better understanding of the characteristics of the field may be had, resulting in profitable knowledge for proper position of pumping equipment, better pumping conditions and maximum efficiency in the production of oil from the hole.

In conjunction with the cleaning out operation, shooting with glycerine has held favor in many cases, and rightfully so, but it is also advisable to consider in many cases a that have responded to shooting and subsequent cleaning ing out operation, in preference to shooting. This treatment is not always effective, but past experience with carbide treatment shows ample return for the effort. Wells that have responded to shooting and subsequent claning with increased production have been further stimulated with the addition of the carbide treatment even after being pronounced "cleaned out" with the usual cleaning out procedure. Experimental treatment with carbide and water showed that in many of these cases, cleaning was only partial. After the heating action of the carbide and water, large quantities of what is undoubtedly caked paraffin, mud and sand are removed. The quantity of carbide used at times has been from 300 to 500 pounds per charge, depending on the size of the shot hole in the pay sand, with the addition of one barrel of water for each 100 pounds. After heating, agitation and bailing out operations have been completed, these wells thus treated in most cases have shown exceedingly good recoveries in oil production over that usually recorded. An accompanying increase in casinghead gas is usually noted. It appears that this operation produces a better cleansing of the pay sand. The productive life of the wells is appreciably extended.

In the operation of many old wells, the operators are sometimes faced with caving conditions which require unusual pulling and cleaning operations and interfere seriously with the normal productivity of the wells. This condition can be corrected satisfactorily by filling the shot hole with river gravel about three quarters of an inch in diameter. The presence of the gravel tends to hold the caving material in place, and at the same time, permits unrestricted drainage of oil to the bottom of the hole for removal. Wells fixed with this remedial measure have given no trouble from caving conditions for periods up to three years thus far. As a result, profitable production has been taken from the wells that normally would have been abandoned. The use of a slotted liner set on bottom of hole permits the placing and operation of pumping equipment at depths that are necessary.

The nursing of the stripper well has been amply helped by pressure drive or repressure methods using gas or air under pressure as the media for stimulating oil sands that have been depleted of the natural gas force that originally produced the oil. Many natural gas gasoline plants are found to be extremely valuable pieces of equipment now even though the return from the natural gasoline production has almost vanished. A gradual transition has taken place. The plants are now serving mainly as a source of marketing casinghead gas and supplying gas under pressure for pressure drive operations. Natural gasoline is still manufactured, but the importance of the plant operation is based on the supply of energy in the form of gas pressure to oil sands. With decline in natural gasoline value and the application of pressure to the oil sand, vacuum conditions are being dissipated, with the result that many plants are dispensing with vacuum pumps and supplying compressor equipment for this newly formed idle

horsepower, thus affording greater capacity for pressure drive operations.

The storage of casinghead gas on many small isolated properties is very useful in nursing the operation of producing wells over the winter season when gas supplies are diminished. Pressure drive or repressure activities have contributed largely to this phase of operation. With the transition from vacuum to positive gas pressure in the casinghead gas gathering system, which pressure drive operation has made possible, satisfactory increased oil production has been obtained with back pressures on the gathering lines being maintained at five to 10 pounds above the atmospheric pressure. This stored gas has been found to be extremely useful in supplying fuel for pumping and oil heating operations for pipe line runs during periods when free gas consumers are making the greatest demands. The gas gathering systems, now operated in many cases with back pressure of approximately five pounds gas pressure, automatically serve as fuel systems for pumping, thus replacing many old separate fuel field systems, the repair and maintenance of which are costly, and in some instances, prohibitive at this time.

Another practical phase of this gas storage plan has been incorporated in small oil property operation. There are properties that do not respond to pressure drive. It happens a well is selected and prepared as a pressure hole. The effort is made to revive the production of the same, but results are not what is desired. The inclination is to withdraw and try another. This well territory can, while not responding properly to pressure drive operations, be termed a profitable operation by continuing to put excess gas in during the warm months when gas is available and making a gas reservoir out of this well. The conversion of these wells to gas reservoirs is extremely useful in nursing operations of production during a severe winter. When the casinghead gas becomes very short, these reservoirs will supply fuel gas that is indispensable.

In the handling of the small oil property under the pressure drive, or repressure method, which is recommended to all operators for at least a trial of the operation, there is the possibility that, through some unexpected circumstances, there is not enough gas to supply simultaneously all the pressure wells with the usual amount of gas, or gas-air mixture. Possibly it is not desirable to mix air with the gas for increased supply of pressure medium, and again possibly the air-gas mixture is of such a nature that additional air to the mixture is not warranted. It has been found feasible under such circumstances where a property is producing nicely with two or three pressure wells, to rotate the full supply of gas to each pressure well for a definite period of time rather than to divide the amount among the three and thus under-feed each pressure well and permit a general lessening of the pressure on the whole property. By rotating the full amount to each pressure well on the property intermittently, it is possible to carry along an improved and profitable condition over a wide pressure area.

A few wells which produce from one half to three barrels of oil per day from lime formation, recently have received profitable attention from the use of commercial hydrochloric or muriatic acid. The action of this material on strictly lime formations has made lime wells that were ready for deeper drilling operations, or abandonment, show recoveries of oil that are extremely satisfactory and the procedure is thoroughly warranted as an experimental operation.

In this Eastern area the oil producing property generally is broken up into farms irregular in shape and ownership. The small production of these properties has made it quite impossible for individual owners to nurse the production along and carry the added burden of an individual pressure drive, or repressure plant. There are, however, opportunities for continued profits from even this type of property. There is the possibility of several small properties lying adjacent to each other, or nearly so, and producing generally from the same pool or sand, being operated as a unit, and sharing in a co-operative pressure drive, or repressure operation, based on a calculated percentage of what the inventory value of the property is to the whole in an operating combination of properties. There are a few profitable undertakings of this nature now operating and others in the making.

In conclusion, the average owner of the stripper well may still be said to have opportunities ahead of him if he but study his property carefully, analyze his costs and plan thoughtfully for the future. The property must be kept in good physical operating shape by gradual replacement of more durable equipment to keep down future costs, and a very conservative and studious experimental management of the producing wells for the greater recovery of oil from the sand. The subject matter of this paper is offered with this in view. Here are a few efforts that have made profitable returns.

Assembling Materials for a test in the Cayuga Area in East Texas

Properties of

Nickel Alloy Cast Irons

and Their Special Applications in Petroleum Production Equipment

O. B. J. FRASER and
J. S. VANICK

CAST iron has always been a useful and low cost material for machine and equipment construction in general, but it has had a position inferior to those of other metals and alloys because of the much lower order of its physical properties. This has been remedied in the course of the last decade or so by the application to cast iron of the alloying principles which for a much longer period have been employed in bettering greatly the physical properties of the related but inherently much stronger material, steel. For some purposes alloy cast iron has supplanted steel, and the two are competitive in many other cases.

After all, cast iron is, in simple terms, an intimate mixture of steel and graphite. It is natural, therefore, to expect that alloying elements would influence the properties of cast iron in manner similar to that in which the properties of steel are influenced by those same elements. That is what happens with alloying elements which are free to enter the steel matrix of the iron, and are not bound up as carbide particles in the presence of the large excess of carbon which cast irons contain.

A more complete definition of cast iron was given in the "Symposium on Cast Iron," held on June 26, 1933, at a joint meeting of the American Foundrymen's Association and the American Society for Testing Materials, to wit:

"The term cast iron is applied to a series of alloys of iron, silicon and carbon, which also contain appreciable percentages of other elements such as manganese, phosphorus and sulfur. Elements such as nickel, chromium, molybdenum, copper, titanium, etc., usually termed alloys, are not infrequently added with the intention of modifying certain properties of the metal.

"Most commercial cast irons contain between 2.50 and 3.75 percent of total carbon and silicon from about 0.25 percent up to 3.00 percent. White, chilled and malleable cast irons usually contain less than 1.00 percent of silicon. Some very heavy gray-iron castings occasionally are made with silicon content below 1.00 percent, but the majority of gray-iron castings contain silicon above 1.00 percent and below 2.75 percent."

Control of Properties

Properties of finished castings are influenced by chemical composition, melting and moulding procedure, and subsequent heat treatment, if any be given.

In a plain-iron the foundryman relies largely upon carbon and silicon for controlling ultimate properties. Irons of lower carbon content are stronger and more uniform than those of higher carbon content, particularly in thick sections and heavy castings. They are also harder and usually more difficult to machine unless corresponding adjustments be made to other elements in the composition than carbon.

IN this paper, after an outline of the nature of cast irons and the methods used to control their properties, the effect of nickel additions—particularly on structure, strength machinability, wear resistance, resistance to impact, and elevated temperature stability—are discussed in detail. The use of quenching and drawing treatments to provide a hard iron for resistance to abrasion and wear are then touched upon.

Special alloy irons of higher nickel alloy content are discussed with reference to their corrosion resistance and wearing qualities, and a number of applications of these types of alloy cast irons to petroleum production equipment described.

Messrs. Fraser and Vanick are members of the development and research department of The International Nickel Company. This paper was read before the Mid-Year Meeting of the American Petroleum Institute, Division of Production at Pittsburgh, May 23, 1934.

The chief means of control is by adjustment of silicon. This element is a powerful graphitizer. Any excess of silicon increases the amount of graphite and lessens the amount of combined carbon. This type of structure is weak mechanically. On the other hand, obtaining high strength by lowering silicon is limited by the occurrence of hard spots which cut down machinability greatly.

Nickel as an Alloying Element

Reasons for adding nickel or nickel and chromium together, to cast iron may be summarized as follows:

Nickel cast iron for general casting purposes usually contains from 0.25 to 5.0 percent nickel in addition to the usual ranges of silicon and carbon.

Nickel is added to gray iron for the purpose of obtaining improved and more uniform structure, hardness, wear resistance, strength in readily machinable castings, and to widen the limits of hardness and to promote machinability. Nickel, however, must be used with care and discretion if economic benefit is to be desired from it. There is no universal formula for nickel iron, but each problem requires its own special prescription.

Effect of Nickel on Gray Iron

Nickel in gray iron depends primarily on the fact that it reduces chilling tendency without appreciably coarsening the graphite structure (or grain) or without lowering the strength. At the same time nickel hardens the pearlite

matrix of the iron. The effects of nickel in gray iron may be enumerated as follows:

1. It reduces chill and the local or general formation of free iron carbide. In this respect it acts just as does silicon, and indeed may replace or supplement silicon in rendering castings gray. Two parts of nickel are generally equal to about one of silicon in reducing chill, although with low silicon content (under 1.0 percent) the relation is nearer three or four to one.

2. In addition to reducing and eliminating free carbide, nickel reduces pearlitic combined carbon mildly, particularly up to about 1.5 percent nickel. With larger amounts of nickel the pearlitic combined carbon is slowly increased again up to about 0.80 percent, the eutectoid amount.

3. It is generally without marked effect on the graphite structure or grain of iron. It does not coarsen fine grained or hard iron appreciably and may mildly refine the structure in medium hard or medium grained iron.

4. Nickel enters into solid solution in the ferrite or pearlite matrix of the iron and changes it progressively into sorbite and even martensite, with over 5.0 percent nickel.

5. Nickel therefore hardens progressively the pearlitic matrix of iron.

6. It is generally without marked effect on the strength of iron. It does not, however, weaken strong or hard iron appreciably, and generally strengthens iron mildly when added in amounts over 1.5 percent.

7. The effect of nickel in amounts up to 5.0 percent on such properties as melting point, fluidity, contraction and shrinkage, viz., those properties of iron which determine the ease of producing castings, is practically negligible.

Nickel and chromium are used together in gray iron primarily for the purpose of refining its structure, and of hardening and strengthening it without impairing its machinability.

With respect to their effect upon iron, chromium resembles nickel in some features. It refines the graphite structure of iron, hardens and strengthens it, but in vivid contrast to nickel, chromium increases the chilling tendency of iron and promotes the formation of free carbide, and its hardening effect on iron is partly due to carbide formation.

Chromium acts, therefore, in an opposite manner both to silicon and to nickel in this respect, and neutralizes their chill restraining effect. One part of chromium will approximately neutralize and balance one and one half parts of silicon or three parts of nickel. Chromium has a pronounced effect on the chilling tendency and therefore on the machinability of gray iron, and it must be used with caution if machinability is to be preserved.

Chromium also acts to build up combined carbon in iron and it is this feature which renders it useful in conjunction with nickel. Nickel does not exert its full beneficial effect upon iron except when the iron has pearlitic structure; viz., when the combined carbon is in the range of 0.6 to 0.8 percent. Hence, it is generally necessary when using nickel in iron to take some other step at the same time to secure high combined carbon, since nickel alone (at least below 1.50 percent) will not normally build it up. It was shown in the data sheet on nickel cast iron that this could be accomplished by lowering the silicon content. An equivalent step is the simultaneous addition of chromium with the nickel.

Nickel and chromium are added to iron in the proportion in which they mutually neutralize each other in respect to chill. The resulting alloy iron will have the same chilling tendency as the plain iron to which the alloys were added, and castings made from it will consequently be as readily machinable as castings from the plain base iron. At the same time the refining, matrix hardening, and strengthening effects of both alloys will be conserved and reflected in the structure and properties of the casting.

It is generally possible to secure about the same measure of improvement in the properties of castings (for equal machinability) either by adding nickel and chromium in balanced ratio (2½ to 1) directly to the plain iron, or by changing the composition of plain iron base by lowering the silicon content and adding an equivalent quantity of nickel.

It is this method of using nickel and chromium, in balanced proportion, which usually gives optimum results in respect both to machinability and to mechanical properties. In addition, it is the simplest method of their use, since they may safely be added directly in these proportions to any plain base iron.

If this ratio is departed from, and in particular, if it is lowered and relatively more chromium used, then other changes must be made as well in the composition of the iron to balance the powerful effect of the excess chromium on chill and machinability. Normally, it is necessary to raise the silicon content by an equivalent amount. For heavy sections or when used in soft (high silicon) iron, this ratio may obviously be lowered to 1.50 to 1, or even 1 to 1.

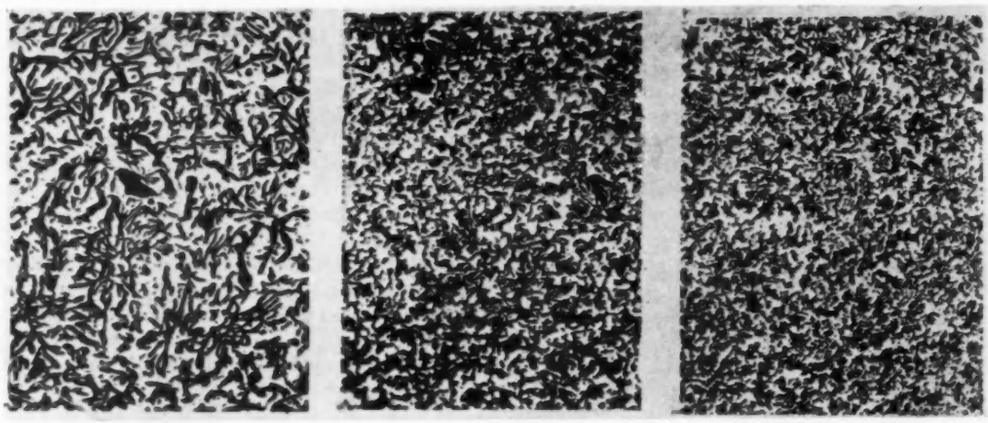
The steel skeleton, composed of pure iron, ferrite, and the iron-iron carbide eutectoid, pearlite furnishes all the strength properties possessed by cast iron. The graphite has a lubricating value where moving parts are involved, and also adds to machinability by breaking up the general structure. It detracts from the physical properties, however, and it will be understood readily that the size and distribution of graphite flakes have a very great influence in determining their magnitude.

Nickel additions have some effect upon the mode of graphitization, as is illustrated by the three photomicrographs of Figure 1, for a moderately hard iron. The graphite flakes are much smaller, or as the foundryman says, the grain is finer, in nickel-bearing irons. Also the distribution of graphite is more even. The result is greater strength. The three irons of Figure 1, were melted and sand cast following identical procedure except for the addition of nickel where and in the amounts shown.

Like silicon, nickel promotes the separation of graphite flakes during and after solidification and inhibits the formation or retention of hard carbides which usually serve no useful purpose in ordinary gray iron. It has the advantage over silicon that the graphite flakes formed in its presence are smaller and hence much less destructive of strength properties than those formed when silicon is the sole graphitizing element. It must be noted that the graphitizing effect of nickel is additive to that of silicon, but with this difference, that nickel will not reduce dissolved carbon below the eutectoid ratio whereas silicon, if present in sufficient amount, will completely break down the structure until only graphite and iron free of carbon remains, resulting in a very soft, weak material.

Since it is undesirable to lower the combined carbon too much it is necessary, in making a nickel alloyed iron, either to lower the silicon in an otherwise satisfactory base mixture, in proportion to the amount of nickel added, or to add with the nickel about 30 to 50 percent of its weight of chromium. The latter in the amount suggested, will insure retention of the required amount of combined carbon. Silicon may be lowered by using steel scrap in the charge.

Nickel not only exerts its effects upon graphitization, but it also dissolves in the ferrite of the steel phase, increasing greatly its tensile strength and elastic properties. Hardness of the matrix is increased uniformly but without



No Nickel | 0.73 Percent Nickel | 2.12 Percent Nickel

FIGURE 1

Effect of Nickel in Refining Grain of Gray-Iron Arbitration Bars of Cupola Iron (3.45 Percent Carbon, 1.0 Percent Silicon). (Magnification, . . . 30).

detracting materially from machinability, as would be the case with elements which raise the average hardness by forming extremely hard carbide granules. The foregoing discussion is based upon the effects of nickel added in amounts of the order of three percent or less. Special irons with higher nickel contents and other alloying elements will be treated separately.

Machinability, Chill Depth and Wear

Machinability and chill depth are related characteristics. An iron that retains too much of its carbon content in the combined form is hard to machine. It has a tendency to form light colored, chilled areas which are composed in large part of the extremely hard carbides. Edges and corners and even the whole mass in thin sections, may be "white" and unmachinable. Tools are dulled very rapidly in contact with carbide patches and will not cut through the massive carbide areas at all. These areas are also quite brittle.

Wickenden[1] has summed up the related attributes of machinability and wear in the following words:

"Considering the characteristics of the various constituents, a good-wearing iron but one that is machinable has the following characteristics:

(1) The presence of well-distributed primary graphite;
(2) A sufficient quantity of combined carbon to make the matrix largely pearlitic or, better still, sorbitic in structure;
(3) The absence of free carbide and phosphide particles.

"When these conditions have been met, the increased hardness will indicate improved wearing property, for the increase in hardness will be produced by a change in the matrix that results from an increased quantity of pearlite or a gradual change to a sorbitic character, and is not due to an increase in the amount of carbide spots."

The manner in which nickel insures uniform hardness over varying sections in a casting is illustrated in Figure 2, which shows the results of a hardness survey along the inner wall of duplicate engine cylinders, one containing nickel the other not.

The casting cools more slowly in the region of the water jacket core because the sand in the core is baked dry—hence retains the heat generated by the flow of liquid metal into the mold—while most of the casting is encased in green or heap sand and cools more rapidly. The slow cooling around the water-jacket exercises a mild annealing effect causing a local softening of the cylinder wall; hence the inclusion of nickel and chromium in the alloyed iron composition to avoid too complete graphitization and local anneal.

From the discussion given already it will be understood that nickel is a "carbide softener" and a "matrix" or "skeleton hardener." It furnishes a means of controlling chill and of hardening the steel matrix uniformly without impairing machinability.

Figure 3 illustrates the influence of nickel in restraining the chilling tendency. The test blocks were of the same base composition with respect to total carbon and silicon content and each was cast with one face against a block of iron. An interesting demonstration of the influence of nickel in a test of this kind, is the ability to produce the five percent nickel block on the right to nearly the same hardness of about 380 Brinell as its plain chilled-through companion on the extreme left—yet be able to machine the five percent nickel one with ordinary tools while the plain iron one cannot be machined at all.

Hardening of the matrix by nickel is progressive and uniform, and is accomplished by increasing its content of the structurally strong pearlite constituent, and by introducing the harder but still machinable constituent sorbite. A full pearlitic structure is obtained with combined carbon

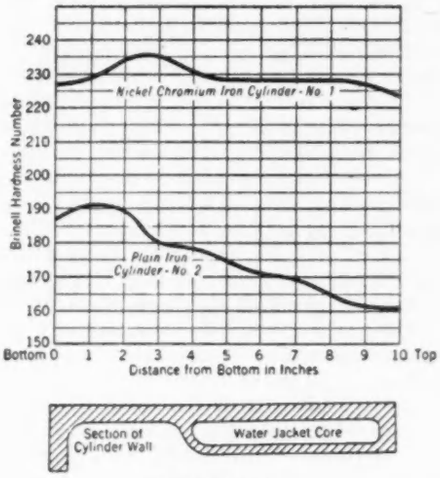


FIGURE 2

Bore Hardness of an Automobile Truck Cylinder in Plain and in Ni-Cr Iron (Day).

[1] "Data on Wear and Machinability of Cast Iron," T. H. Wickenden, J. Soc. Automotive Engineers, 22, 208 (1928).

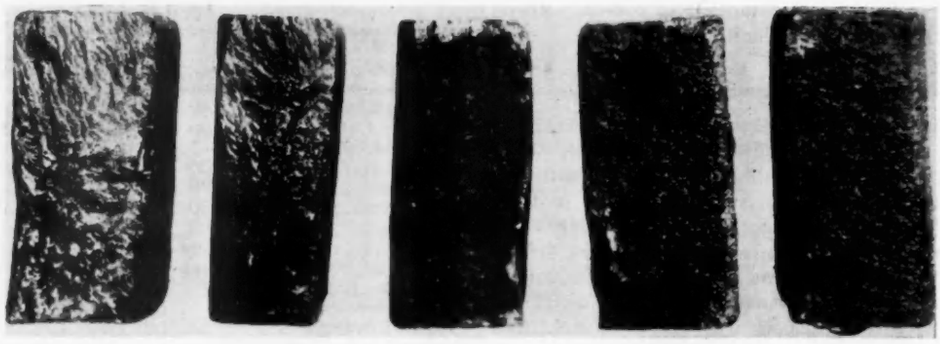


FIGURE 3
Eliminating Chill in Cast Iron with Nickel (3.60 Percent Carbon—0.79 Percent Silicon Iron). (2-In. × 4-In. Chill Block).

in the eutectoid ratio of 0.80 percent. This structure has better physical properties and greater wear resistance. Its attainment in an unalloyed iron is not always easy since it is dependent upon a low silicon content and upon the section and cooling rate of the individual casting. The avoidance of chilled and unmachinable areas with the retention of the full pearlitic structure is a much more simple matter when advantage is taken of the effects of suitable additions of nickel or of nickel plus chromium. Figures 4 and 5 illustrate pearlitic and pearlitic-sorbitic structures obtained in machine tool castings of a low silicon iron containing as little and one percent of nickel. Irons of this type are frequently employed in engine or compressor frame castings and may contain

2.90 to 3.30 T.C.
.90 to 1.80 Si.
.60 to .80 Mn.
.75 to 1.25 Ni.

Pearlitic nickel alloy irons having Brinell hardness values of 200 to 250 are readily machinable. At the higher value

FIGURE 4
Pearlitic Structure in Thick Sections (2¼ In.) of Low-Silicon, 1-Percent Nickel-Cast Iron. (Magnification, 398 ×).

FIGURE 5
Pearlitic-sorbitic Structure, with Practically no Free Carbide, in Thin Sections (¼ In.) of Same Iron as Figure 4. (Magnification, 398 ×).

the machinability is fully as good as that of ordinary gray iron having a hardness of 180 Brinell.

Wear Resistance

Wear in cylinder liners, brake drums, etc., is accentuated by carbide spots, which become disengaged particles, hard and abrasive in nature. The rubbing of these particles soon produces high metal losses. Additions of one to five percent of nickel in the harder irons used for such purposes insures the full pearlitic structure essential to a high order of wear resistance and at the same time freedom from the detrimental carbide spots. Moreover, even heat distribution, which enhances resistance to warpage, is insured by the uniformity of distribution of the combined carbon in the alloyed irons.

Huss[2] has given the results of wear tests on alloyed and unalloyed irons which were studied in a search for suitable materials for rotary pump castings. Figure 6 and Table I are taken from his paper, as is the following quotation:

"Throughout the investigation it was quite evident that an iron having a toughened or hardened matrix supporting the hardened and stabilized carbide was best suited to wearing service. It is well known that nickel, being soluble in iron, hardens and strengthens the ferrite matrix. Also equally well known is the fact that chromium forms with a certain amount of iron the double carbide of iron and chromium. It is our thought (and this is substantiated by evidence presented) that it is only necessary to include enough chromium to harden and stabilize this carbide. Too much chromium is detrimental, since the carbide then becomes friable, breaks up and adds to the abrasion effect by actually furnishing more abrasives in the form of minute particles of carbide.

"From experience and test data gathered at this plant a gray iron of the following analysis will give very good resistance to the many types of abrasion encountered, will be strong, tough, possess a close grain structure free from casting difficulties, and lastly will be free machining.

Total Carbon	3.20—3.30
Combined Carbon	.50— .60
*Silicon	1.60—2.00
Manganese	.60— .70
Phosphorus	.30 Max.
Sulfur	.10 Max.
Nickel	1.00—1.25
Chromium	.25— .35

*Silicon to be varied according to cross-sectional size of casting

Similar evidence has been presented by Bornstein[3] from operating tests on tractor engine cylinders. Nickel-chromium alloy iron cylinders containing 0.68 percent of nickel and 0.22 percent of chromium were 26 points higher in Brinell hardness and showed only 68 percent of the wear of plain cast iron cylinders. Obtaining further resistance to wear by means of heat-treating cast iron is described later in this text.

Increasing Strength

The American Society for Testing Materials, in 1932, issued A.S.T.M. Tentative Specifications for Gray Iron Castings (A 48-32T)[4], for castings for high strength applications. The data of Table II are abstracted therefrom. This is of interest in the present case because by the application of proper foundry procedure nickel alloy irons of the highest strength classification given in the specifications are in regular daily production.

[2] E. H. Huss (The Viking Pump Co.), "Long Wearing Irons Extend Pump Life," Nickel Cast Iron News, 3, No. 4, (Oct. 1932), pp. 6-7.

[3] Proc. A.S.T.M. 29, Part II, 167-8 (1929).

[4] Proceedings A.S.T.M., 32 Part I, 625 (1932); 1932 Book of A.S.T.M., Tentative Standards, p. 179.

TABLE I

	Iron Test No. 1	Iron Test No. 2	Iron Test No. 3	Iron Test No. 4
Total Carbon	3.40	3.42	3.62	3.54
Graphitic Carbon	2.95	2.90	2.82	3.54
Combined Carbon	0.45	0.52	0.80	Nil
Silicon	2.20	2.28	1.80	2.57
Manganese	0.70	0.77	1.24	0.62
Phosphorus	0.30	0.245	0.286	0.643
Sulphur	0.08	0.061	0.141	0.107
Nickel	None	1.23	0.18	None
Chromium	None	0.21	0.56	None
Hardness—Rockwell B. Scale— Average (6-10 Readings)	88	93	94½	86
Brinnell Hardness*	174	197	199	167

*Conversion from Huss' data by present authors.

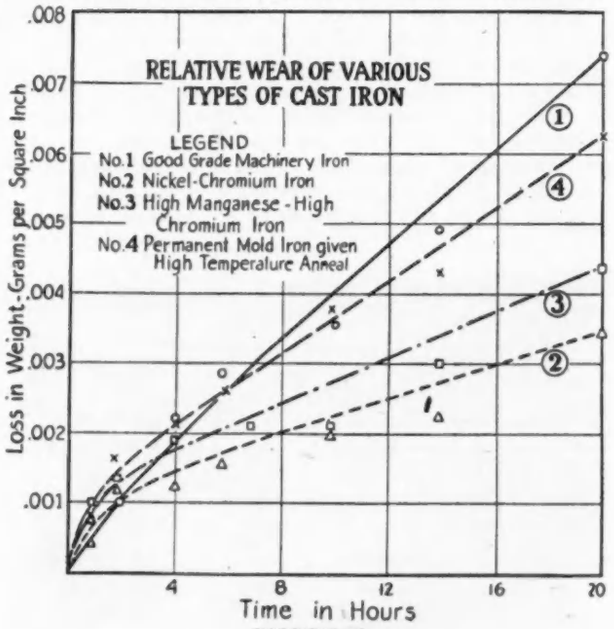


FIGURE 6
Graphic Data of Table 1

TABLE II
Classifications of High Strength Cast Iron, from A. S. T. M. Tentative Specifications A 48-32 T.

Class	Min. Tens. Strength, psi.	Transverse Strength, lb. load for 1.2 in. bar x 18" span
20	20,000	1,700
25	25,000	1,900
30	30,000	2,100
35	35,000	2,300
40	40,000	2,500
50	50,000	2,800
60	60,000	3,100

The class 40 and 50 range of properties is met easily by nickel and nickel-chromium cast irons as is evidenced by the data of Table III, taken from a technical bulletin of the International Nickel Company.

Class 60 specifications or better is met readily in nickel alloyed gray cast irons through the agency of special melt-

TABLE III

High Test Alloy Cast Iron.
Tensile Strength 40,000 p.s.i. to 48,000 p.s.i.

Column	1	2	3	4	5	6	7	8	9	10	11	12
Section	¼″ to ½″	¼″ to ½″	¼″ to ½″	½″ to 1″	½″ to 1″	½″ to 1″	1″ to 2″	1″ to 2″	1″ to 2″	2″ to 4″	2″ to 4″	2″ to 4″
Brinell Hardness	180	220	260	180	220	260	180	220	260	180	220	260
Machinability	Readily	Good	Economically	Readily	Good	Economically	Readily	Good	Economically	Readily	Good	Economically
Wear Resistance	Good	Very Good	Excellent	Good	Very Good	Excellent	Good	Very Good	Excellent	Good	Very Good	Excellent
Density	(4)	(5)	(5)	(4)	(5)	(5)	(4)	(5)	(5)	(4)	(5)	(5)
Total Carbon	3.20-3.40	3.10-3.30	3.00-3.20	3.10-3.30	2.90-3.10	2.80-3.00	3.00-3.20	2.90-3.10	2.80-3.00	2.90-3.10	2.80-3.00	2.70-2.90
Manganese	0.55-0.75	0.55-0.75	0.55-0.75	0.75-0.95	0.75-0.95	0.75-0.95	0.75-0.95	0.75-0.95	0.75-0.95	0.75-0.95	0.75-0.95	0.75-0.95
Phosphorus (1)	0.30	0.30	0.30	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Sulphur (1)	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.12	0.12	0.12
Silicon	1.60-1.80	1.40-1.60	1.20-1.40	1.20-1.40	1.10-1.30	1.00-1.20	1.00-1.20	1.00-1.20	0.90-1.10	0.90-1.10	0.80-1.00	0.70-0.90
Nickel	1.25	1.25	2.00	1.25	1.75	1.75	1.25	1.75	1.75	1.25	2.00	2.00
Chromium	None	None	None	None	None	0.25-0.35	None	None	0.25-0.35	0.25-0.35	0.35-0.45	0.50-0.60

(1) Maximum (2) Minimum (3) Sound in uniform sections. (4) Sound within section limits at top of column. (5) Sound throughout widely varying sections.

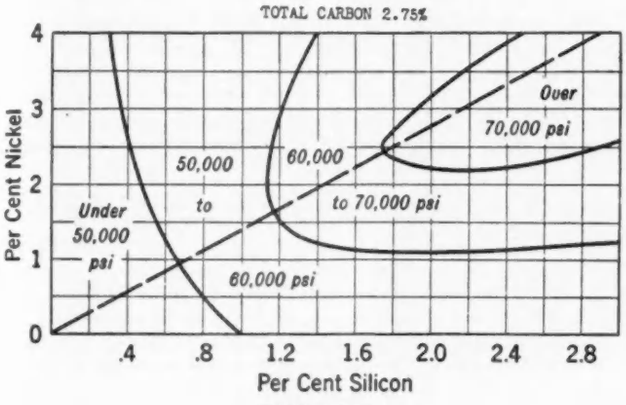


FIGURE 7

Proportions of Nickel and Silicon to get various ranges of tensile strength in sections from ½ in. to 4 in. thick.

ing procedure. This type of iron has been trade named "Ni-Tensyliron." A great many foundries are producing it to meet the 50000 psi. specification and several are bettering the 60000 psi. specification regularly. By special thermal treatment of the castings considerably higher strengths than those cited are obtainable.

The composition of Ni-Tensyliron may be varied over a fairly wide range to accommodate varying sizes and thickness of castings. The general range is given in Table IV.

[5] R. S. MacPherran, Proc. A.S.T.M., **29**, Part II, (1929).

TABLE IV

Composition of Ni-Tensyliron.

Total Carbon	2.50—3.15%
Manganese	0.50—0.90%
Phosphorus	0.15% Max.
Sulfur	0.12% Max.
Silicon	1.20—2.75%
Nickel	1.00—4.00%
Chromium or Molybdenum	0.0 — .50%

In some cases slightly higher strengths are obtained, particularly in heavy sections, with additions of 0.35 to 0.50 percent of either chromium or molybdenum.

The full ranges of properties obtainable in irons of this class are given in Table V. The bearing of composition upon strength ranges is given in Figure 7.

The uniformity of Ni-tensyliron in heavy sections is shown by the data of Table VI, which is due to MacPherran[5] who has shown that the Brinell hardness of plain gray iron varies from 22 to 30 points from the outside to the center of four-inch rounds, whereas high strength nickel cast iron was uniformly hard throughout similar sections. The strength throughout the heavy section is well maintained while the strength of ordinary cast iron may decrease 50 percent or more in the core of heavy sections.

The Ni-tensyl type of cast iron finds application for mud

TABLE V

Physical Properties of Ni-tensyliron.

Transverse breaking load[4]	4,500 to 8,000 lbs.
Deflection	0.11 to 0.25 inch
Tensile strength (arbitration bars[1])	50,000 psi. to 75,000 psi.
Compressive strength	165,000 psi. to 190,000 psi.
Proportional limit tension[2]	10,000 psi. to 14,000 psi.
Proportional limit compression[2]	25,000 psi. to 40,000 psi.
Elastic Modulus (tension and compression)[3]	20,000,000 psi. to 23,000,000 psi.
Brinell hardness[1]	220 to 320
Fatigue limit	50% to 57% of tensil strength

[1] Particular value obtainable depends upon silicon and nickel content.
[2] By repeated loading method.
[3] Up to proportional limit.
[4] 1¼″ round—12″ centers.

TABLE VI

Properties of Cast Irons.

Property	Plain Iron	High Test Iron	Ni-Tensyliron A	Ni-Tensyliron B	Ni-Tensyliron C
Total Carbon	3.25	2.95	2.60	2.70	2.92
Silicon	1.40	1.00	1.57	1.71	1.45
Nickel	None	1.10	1.34	2.42	4.01
Tensile strength 4″ round p.s.i.					
Outside	29,000	41,800	59,000	68,600	55,000
Center	16,150	31,400	45,600	48,200	42,200

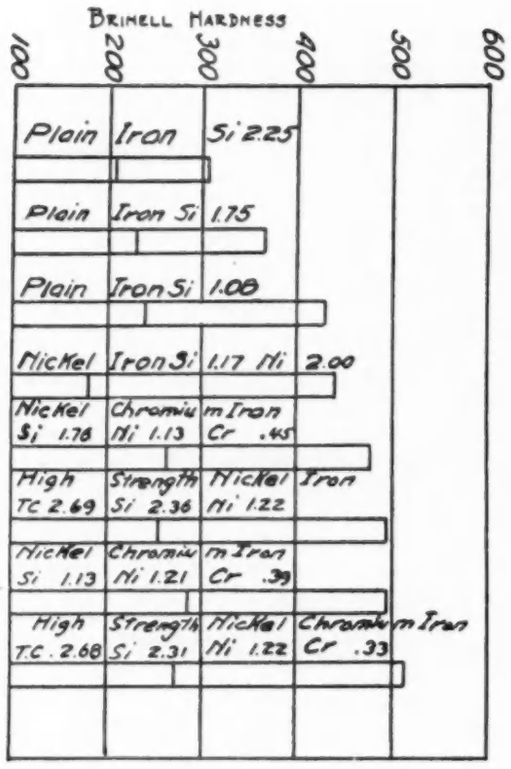


FIGURE 8

Graphic representation that alloy iron and particularly nickel-chromium irons develop greater hardness than plain iron when quenched in oil. Lower division of each column represents the hardness of the "cast" condition.

and slush pump frames and bodies as well as for centrifugal pump and valve body castings.

Heat Treatment

The 1933 "Symposium on Cast Iron," referred to already notes that "cast iron is directly comparable with steel in its reaction to heat treatment, the only fundamental difference in the composition of the two materials being the presence of free graphite particles in gray cast iron." There are several types of heat treatment which can be applied to cast iron, not all of which are of interest to petroleum engineers. If the discussion be confined to quenching and drawing treatment with the object of providing a hard iron for resistance to abrasion and wear, it will be sufficiently extensive. With the required pearlitic or sorbitic structure cast iron can be heated above the critical temperature and quenched and tempered in about the same way as steels. Alloyed irons provide better properties after heat treatment than plain irons as is evidenced by Figures 8 and 9.[6] The nickel irons are particularly useful for heat treating because nickel lowers the critical temperature ranges. This permits lower quenching temperatures which results in less graphitization at heating temperatures, in less distortion, less risk of cracking and more uniform hardening.

Hurst[7] has published results of hardening and tempering treatments of a 3.37 percent Ni,-0.61 percent Cr. cast iron. This type of iron he found to be particularly good for the purpose, the nickel content being credited particularly with insuring greater uniformity and depth of hardening as well as with increasing the degree of hardness beyond that obtainable with plain cast iron.

Impact Strength

Cast iron is not usually considered a tough material, but the better grades are used under circumstances where resistance to shock is essential. The high strength nickel alloy irons of the Ni-Tensyliron type have about twice the impact strength of the best grades of plain cast iron.

Some production operations are carried out in regions where temperatures much below zero occur during the winter months. Impact properties of many metallic materials drop to low values at sub-zero temperatures and this is true of cast iron as a class. The alloyed irons not only have higher impact strength than plain irons at normal temperatures but retain a larger proportion of the normal temperature values at sub-zero levels. Table VII gives the results of Izod impact tests made on 1.20-inch diameter sand cast bars six inches long. The highly alloyed irons will be discussed for other properties further on in the paper.

Bornstein[8] has reported the results of a series of 30 tests in which plain and nickel alloy high-strength iron were compared by dropping a 100-pound weight from different heights on a 1.20-inch sand cast bar supported horizontally on four-inch centers. The plain iron, which had a tensile strength of 33,500 psi., broke at drops of six to 10 inches, averaging 7.2 inches. The 1.25 percent nickel

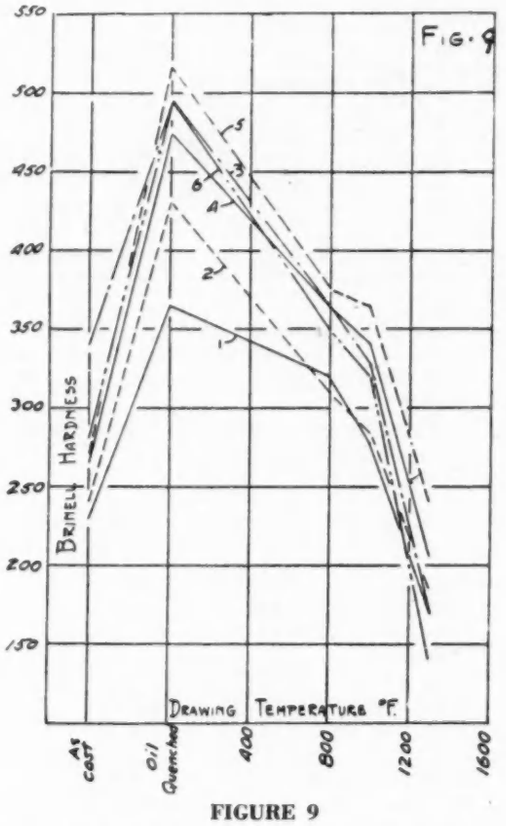


FIGURE 9

Effect of drawing temperature after quenching into oil from 1500° F. on Brinell hardness of plain and alloy cast iron.

No.	1	2	3	4	5	6
Total Carbon	3.10	3.12	3.10	3.15	2.68	2.69
Silicon	1.69	1.08	1.13	1.76	2.31	2.36
Nickel	None	None	1.21	1.13	1.22	1.22
Chromium	None	None	0.39	0.45	0.33	None

[6] F. B. Coyle, "Heat Treatment Fundamentals of Plain and Alloy Cast Iron," Metals & Alloys, 2, 120-31 (1931).

[7] "Hardening of Cast Iron by Heat Treatment," by J. E. Hurst, Iron Age, October 26th, 1933, p. 24.

[8] Proc. A.S.T.M., 29, Part II, III, (1929).

TABLE VII

Impact Properties

	T.C.	Si.	Ni.	Cr.	Cu.	Room Temp.	—45°F.
Plain C. I.	3.44	1.96	.....	.....	.....	39	29
Nickel C. I.[1]	2.76	2.02	1.75	.....	.....	44	38
Ni-Resist C. I.	2.73	1.59	13.76	1.95	6.0	55[2]	50
Invar C. I.	2.50	1.40	30.00	4.00	.....	81	70

[1]High Test Type (develops up to 60 ft. lbs.)
[2]Values as high as 70 ft. lbs. have been developed in softer grades.

iron, which had a tensile strength of 61,600 psi., broke at drops of 11 to 20 inches, averaging 16.2 inches.

Heat Resistance

The behavior of materials at elevated temperatures is of interest in production operations to a limited extent. Braking on draw-works and hoists develops large quantities of heat which raise the metal parts to high temperatures. These and engine parts such as cylinder liners and heads are the points of application for heat resisting properties. In none of these cases is the temperature reached above 1300° F., the transformation range temperature of cast iron. In the range below this permanent growth of cast iron over long periods of time at the higher temperatures is conceded to be due to decomposition of iron carbide, graphitization and oxidation. High silicon and high total carbon favor growth. So also does nickel but in an extremely mild degree. Chromium retards growth. Since silicon because of its easy oxidation promotes growth, it becomes important to reduce this element to a low percentage in the iron and replace its necessary graphitizing action in the original casting with suitable amounts of nickel. This nickel together with as much chromium or molybdenum as can be carried without causing chill spotting or forming carbide clusters, should make an excellent composition to resist thermal deterioration and perform well at elevated temperatures. This is found to be so and large use is made by engine builders of irons of suitable composition. Good results are obtained at temperatures up

TABLE VIII

Stability of Cast Iron at 1100° F. Composition—Percent

Material	Total Carbon	Silicon	Nickel	Chromium
Plain iron	3.44	1.96	.....	.....
Nickel-chromium iron	3.41	1.97	1.73	0.60

Volume Increase After Indicated Number of Hours—Percent

Material	72 hr.	185 hr.	303 hr.	422 hr.	542 hr.	662 hr.
Plain iron	2.16	2.97	3.74	3.86	4.12	4.17
Nickel-chromium-iron	0.68	1.06	1.57	1.57	1.78	1.82

Brinell Hardness After Indicated Number of Hours.

Material	Start	113 hr.	231 hr.	350 hr.	422 hr.	542 hr.	662 hr.
Plain iron	179	103	95	102	105	89	101
Nickel-chromium-iron	217	179	163	168	165	156	156

TABLE IX

Typical Application of Ni in Cast Iron.

	TC	Mn	Si	Ni	TS** 1000 Lbs.	BHN	Per cent Steel in Charge*
Light Machine Tool Beds.	3.40	0.55	1.75	0.75	32	200	15-25
Heavy Machine Tool Beds	3.20	0.80	1.00	1.00	40	200	50-85
Extra Duty Machine Tool Beds	2.85	0.80	1.75	1.50	44	240	75-85
Pump Bodies	3.30	0.65	1.50	1.25	36	200	20-50
Valve Bodies	3.25	0.65	1.40	0.75	36	200	20-30
Light Bushings	3.10	0.55	1.50	1.25	35	200	20-30
Heavy Bushings	2.90	0.80	1.10	1.25	42	200	40-80
Heavy Compressor Cylinders	3.00	0.80	1.10	2.00	40	220	20-40
Heavy Diesel Cylinders	3.00	0.85	1.00	1.25	40	220	30-70
Locomotive Cylinders	3.00	0.85	1.10	1.25	40	200	30-70
Heavy Crusher Frames	2.75	0.80	1.75	2.00	55	230	85-97
Light Gears	3.30	0.55	1.50	1.25	38	200	20-40
Heavy Gears	3.00	0.80	1.00	2.00	42	220	30-70
Light Rest Grids	3.50	0.65	2.75	4.00	25	385[1]	....
Valve Lifters	3.40	0.55	2.60	0.75	25[3]	550[2]	....
Heavy Cylinder Liners	3.10	0.80	1.00	1.00	40	220	30-60
Light Pistons	3.40	0.65	2.50	1.00	32	180	15-20
Heavy Pistons	3.20	0 65	1.10	1.25	36	220	20-60
Medium Piston Rings	3.30	0.55	1.50	1.25	35	200	15-30
Heavy Piston Rings	3.00	0.85	1.10	1.25	40	220	30-70
Elevator Sheaves	3.00	0.80	1.00	1.25	42	220	40-80
Heavy Machine Tool Tables	2.90	0.80	0.90	1.50	42	200	40-85

*A wide range in steel content has been given since the exact amount required to obtain the recommended TC content will depend on the characteristics of the individual furnace in which the material is produced. The extremes given have, however, been successfully used, and the foundryman can determine the exact amount with a knowledge of melting conditions in his own unit.
**In Arbitration Bar Section.
[1]High hardness due to martensitic structure in light grid section.
[2]Hardness on chilled face.
[3]Strength in grey section.

TABLE X

Typical Applications of Ni and Cr in Cast Iron

	TC	Mn	Si	Ni	Cr	TS** 1000 Lbs.	BHN	Per cent Steel in Charge*
Light Cams	3.10	0.55	1.50	1.25	0.30	35	200	20-30
Heavy Cams	3.10	0 60	1.50	2.00	0.60	42	200	50-80
Air Cooled-Cylinders	3.30	0.60	2.35	2.00	0.20	28	200	0-15
Automotive light Cylinders	3.30	0.55	2.10	0.75	0.30	36	200	15-25
Heavy Automotive Cylinders	3.30	0.65	1.85	1.75	0.50	36	220	20-35
Light Compressor Cylinders	3.30	0.55	2.10	1.25	0.45	36	210	15-20
Light diesel Cylinders	3.30	0.65	1.85	1.75	0.50	36	220	20-35
Light Forging Dies	3.30	0.60	1.50	1.50	0.60	38	300	20-50(A)
Heavy Forging Dies	3.00	0.60	1.25	2.75	0.80	45	300	40-70(B)
Light Brake Drums	3.30	0.65	2.10	1.50	0.40	35	220	15-25
Heavy Brake Drums	3.10	0.80	1.80	2.25	0.50	38	220	15-25
Clutch and Hoist Drums	3.00	0.85	1.10	1.25	0.30	40	220	30-70
Cylinder Heads	3.30	0.55	2.10	1.25	0.45	38	220	15-20
Light Cylinder Liners	3.25	0.55	2.00	1.75	0.50	36	220	20-40
Exhaust Manifolds	3.50	0.65	1.80	2.00	0.75	36	200	0-20(C)
Permanent Moulds	3.25	0.55	1.75	1.50	0.60	38	220	20-40
Clutch Plates	3.30	0.65	2.10	1.50	0.40	35	220	15-25
Light Machine Tool Tables	3.40	0.65	1.90	0.75	0.30	32	200	10-20

*A wide range in steel content has been given since the exact amount required to obtain the recommended TC content will depend on the characteristics of the individual furnace in which the material is produced. The extremes given have, however, been successfully used, and the foundryman can determine the exact amount with a knowledge of melting conditions in his own unit.
**In Arbitration Bar Section.
Heat Treatments.
(A) Oil quench 1575° F.—1600° F. Draw 800° F.—1100°F.
(B) Oil quench 1550° F.—1575°F. Draw 800°F.—1100°F.
(C) Anneal at 1400° F.

to 1200° F., with irons having the following compositional ranges:

Total Carbon	3.10—3.25%
Silicon	0.75—1.50%
Manganese	0.60—0.80%
Nickel	1.00—2.50%
Chromium	0.50—1.25%

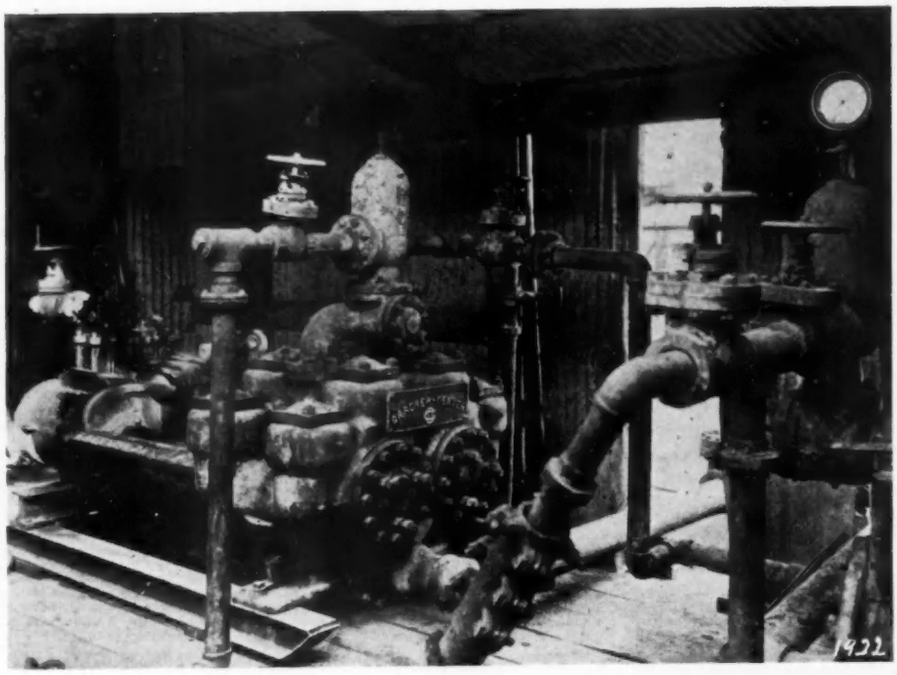


FIGURE 10
Steam-Driven Slush Pump—California

The results of some tests to evaluate stability of irons at 1100° F., are given in Table VIII. The tests were made in an electric heating furnace and were reported previously by Wood[9].

Use of Low Alloy Irons

Typical applications of low alloy content nickel and nickel-chromium cast irons are given in Tables IX and X. Many of those listed will be recognized as component parts of oil production equipment. Such irons are used freely by manufacturers of pumps, compressors, gas engines, oil engines, etc. Centrifugally cast cylinder liners of nickel and nickel-chromium cast iron, usually heat-treated have very wide application amongst equipment manufacturers. The high strength varieties are used for many other parts of oil field equipment where "machinable high strengths" are required. Gears, pinions, piston rings, valves, pump plungers, cams, housings, frames, etc.

Figure 10 shows a steam-driven slush pump at work in California. The fluid end, pistons, cylinder liners and valve plate covers are of cast iron containing 1.25-1.75 percent of nickel and 0.30 to 0.50 percent of chromium. This iron can be machined, like the nickel alloy irons in general, to a fine, smooth finish. The tensile strength of this particular iron is 45,000 psi., or more and the density is uniform throughout the heaviest sections. Some pumps of this type are regularly made with 50,000 and 60,000 psi. tensile irons capable of resisting more than double the pressure applied to their predecessors, and possessing in addition an improved resistance to impact or shock. Such irons usually contain 2.60-3.00 T.C., 1.20-2.0 Si., 1.50-2.25 Ni., with other elements normal. Cupola practice requires the use of over 60 percent of steel in the charge and frequently over 80 percent of steel.

Figure 11 shows a gasoline pipe line pump, many of which are in service. Liners, heads, plungers, fluid bodies and piping are of the high test variety of nickel cast iron containing from 1 to 1.75 percent of nickel depending upon the type of casting. This iron has 40,000 psi., minimum tensile strength. A gasoline pipe line from Texas to

[9] T. J. Wood, "Cast Iron at Elevated Temperatures," Iron Age, 132, (July 13, 1933), 13.

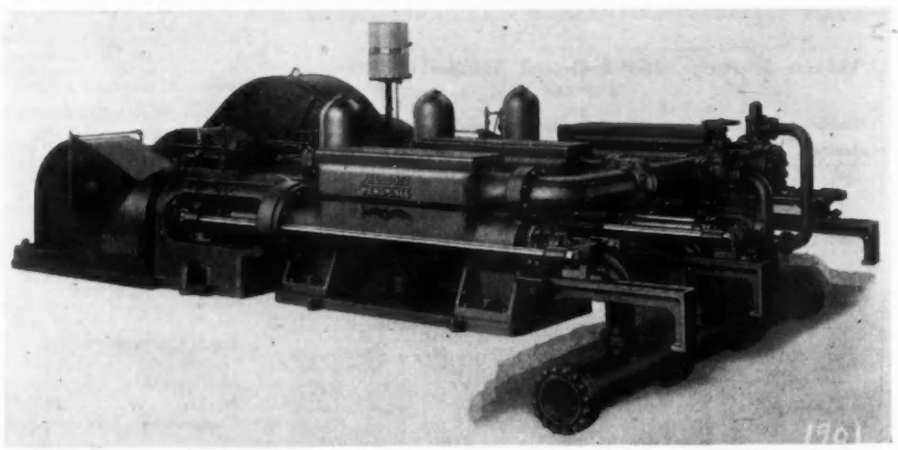


FIGURE 11
Gasoline Pipe Line Pumps

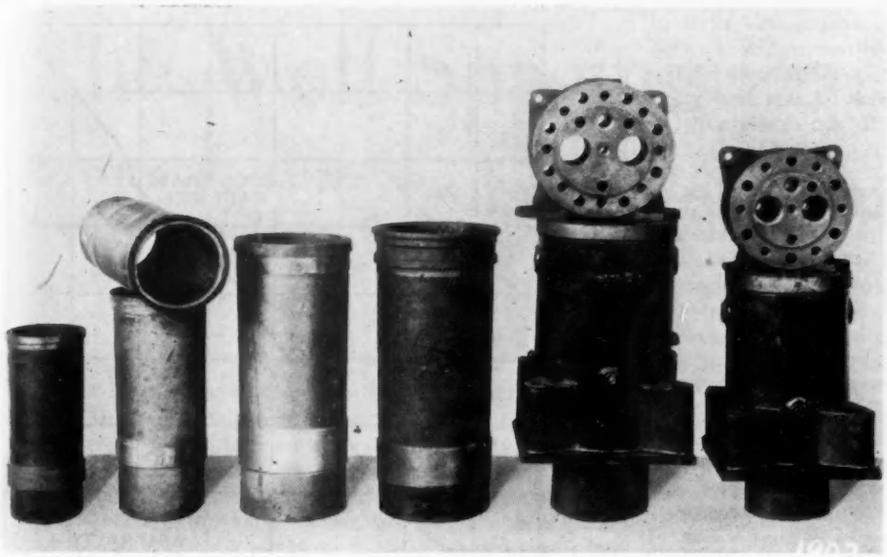


FIGURE 12
Cylinder Heads and Liners of Typical Diesel Engine

Chicago is equipped with some 19 centrifugal pumps of which casings, impellers, wearing rings, and other parts are made of a two percent nickel cast iron.

Thirteen stations of the Great Lakes Pipe Line Company line from the Mid-Continent fields to Chicago are equipped with electrically-driven liquid cooled pumps of which the casings, wearing rings and bushings are made of nickel cast iron.

In Diesel engines, cylinder heads, liners, pistons and rings are rather generally made of nickel cast irons. Requirements are strength at moderately elevated temperatures, minimum growth under repeated heating, maximum wear resistance and dense, non-porous structure. Temperatures range from atmospheric to 630° F., or more and may reach 1000° F., in cases of stoppage of the cooling system. Working pressures normally do not go above 600 psi., but may occasionally reach 750 psi. Figure 12 shows cylinder heads and liners of a typical modern Diesel engine. These contain up to two percent of nickel. In some instances these castings contain chromium and molybdenum as well as nickel and in certain instances they are centrifugally cast and heat treated.

Many gas engine-driven compressors for gas, pipe line service have cylinders, liners, heads and pistons made of nickel cast iron, further fortified with chromium and molybdenum in certain cases.

Oil well pumps also are made in part of nickel alloy cast iron. Working barrels made of this type of iron by boring from a solid cast bar have been on the market for a year or more. The smooth finish which can be given the nickel bearing iron is of considerable advantage in this application, as it is in cylinder liners of other types of pumps and of engines and compressors.

Drilling engine and slush pump cylinder liners of heat treated nickel-chromium cast iron have given excellent performances. One manufacturer uses an entire fluid end of nickel cast iron without a liner until wear in service requires one as a maintenance replacement.

The high degree of wear resistance and the stability against structural breakdown under abnormal heating possessed by the nickel-chromium cast irons has caused those compositions to be used widely by the automotive industry for brake drums on trucks and buses. Steels are more usual for braking surfaces on draw works and hoists, but nickel cast iron brake rings are being used to an increasing extent.

Sheaves of cast iron are less commonly used than those of alloy steels. Where the service required is not too heavy the nickel alloy irons make excellent materials for the purpose. They are used to a large extent now for office building elevator service.

Cast-iron bodied valves put out by some manufacturers for oil field service at working pressures up to 800 psi., are nickel irons of the high strength type. In some cases the added resistance to impact or breakage which such iron possesses makes it a suitable low cost material for the purpose. Standard specifications[10] for gray iron valves, flanges and pipe fittings have been adopted which, for class B material, represent an appreciable improvement in the quality of iron for these castings. Tensile properties of 21,000 min. for Class A, and 39,000 min. for Class B, are

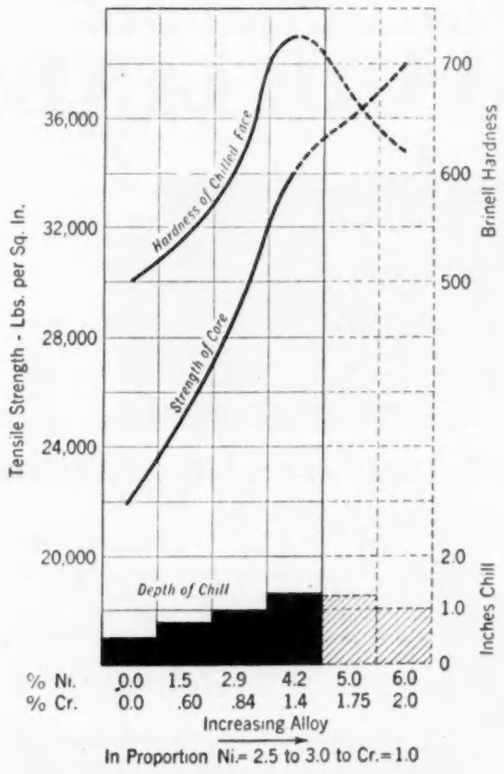


FIGURE 13
Total Carbon, Approximately 3.5 Percent Silicon, 0.95 to 1.0 Percent

specified. Some pipe line operators feeling the need of greater strength, have used and continue to specify cast irons of 40,000 and 50,000 psi. tensiles which can be readily met in the high test or Ni-tensyl types of cast iron made with upwards of 60 percent of steel in the cupola and finishing in the composition range of T. C. 2.60-3.10, Si. 1.40-2.20, Ni. 1.40-2.25, Mn. .60-.90.

Special Alloy Irons

An extremely hard, white cast iron unmachinable and possessing a hardness in excess of 600 Brinell has been developed and trade-named "Ni-Hard." It contains approximately four to five percent of nickel and 1¼ to two percent of chromium, but its application to oil production equipment has not been developed although welding rods of it have been used in patching worn surfaces, sleeves for working barrels and caterpillar type tractor tread idlers have been made of it. The need to shape surfaces by grinding has deterred the use of this un-machinable material in favor of the alloy hardened "as cast" or "heat-treated" machinable compositions. Figure 13 illustrates its properties in comparison with an ordinary base composition of cast iron.

Another special composition widely used in the petroleum industry and trade-named Ni-Resist, contains 14 percent of nickel, six percent copper and two to three percent chromium, cast to a hardness of 140 to 200 Brinell, combined with its high degree of corrosion resistance, Ni-Resist becomes a valuable material for many applications requiring a combination of properties such as simultaneous resistance to wear and corrosion. Much of it has been applied to valve, pump, and compressor bodies and trim in pipe line work while tank, tank car, and tanker vent valves, etc., have been made of it for the transportation divisions. The effect of common corrosives such as salt and hydrogen-sulfide which are commonly met with in production and transportation, are indicated in Figure 14 and in Table XI. Tests in abrasive solutions (Table XII) indicate its advantage in this respect over plain cast iron.

[10] American Society for Testing Materials, A.S.T.M., Standards, 1930, Part I, p. 499.

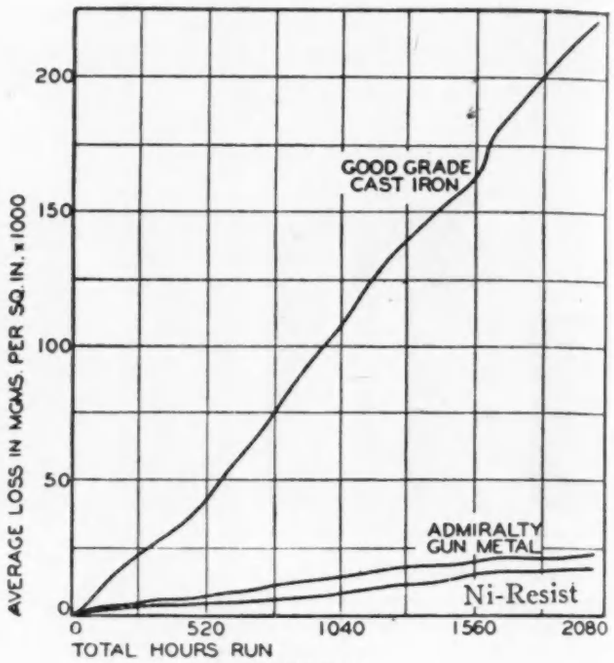


FIGURE 14
Relative Corrosion in Aerated Sea-Water

TABLE XI
Weight Loss—Grams /Meter[11] Exposure to Saturated H_2S in Water at 180° F.

Material	100 hours	200 hours	300 hours	400 hours
"Ni-Resist"	59.68	83.45	83.45	83.45
Semi-Steel (12½% Steel)	79.05	189.10	221.65	248.00
Piston Ring Cast Iron	156.55	215.00	252.65	294.50
Machine Steel .35—45% C.	85.25	217.90	310.00	362.70

[11] Nickel Cast Iron News—February, 1932.

TABLE XII
Weight Loss of Austenitic and Ordinary Cast Irons Under Erosive Conditions, Mather & Platt, Ltd.

Mixture	Ni-Resist type Alloy	Cast Iron
Sand and water 50/50	145	320
Coal dust and water 50/50	18	84
Clinker and water 50/50	144	320

A special grade of Ni-Resist possessing physical properties somewhat better than those of malleable cast iron in that its tensile strength ranges from 60,000 to 100,000 pounds psi., and its elongation in two inches 8-25 percent, is being developed for such applications as pipe line flanges and bolts subjected to severe corrosion conditions where extra strength and toughness are required.

In conclusion the authors wish to acknowledge the help of their associates and, in particular, that of Mr. F. B. Coyle and Mr. T. J. Wood, of the Development and Research Department of The International Nickel Company.

Williamsport
WIRE LINES

Accepted as the Standard

. . . in every field—this is the wire line with the Telfax System of Tape Marking which shows the grade of steel in every Williamsport line you buy—no make of other wire lines give you this protection. Why take chances when Williamsport's proven grade is at hand in every field?

We are now making "Form-Set," the newest Preformed Wire Lines. If you are interested in lines of this kind made to Williamsport standard, use "Form-Set."

WILLIAMSPORT WIRE ROPE CO.

Main Office and Works: Williamsport, Pa.
Branch Sales Offices: 122 S. Michigan Ave., Chicago, Ill.
Mid-Continent Supply Company
Distributors in Texas, Louisiana and Arkansas.

The Well Spacing Problem . . .

Low Well Density Increases Ultimate Recovery

JOHN R. SUMAN
Vice President, Humble Oil & Refining Company, Houston, Texas

IN this paper it is set out that wider well spacing will yield greater ultimate recoveries from oil fields than the American producing industry has enjoyed heretofore. Further it is shown that wider well spacing will go far toward relieving the producing industry of some of its most sinister present ills.

This paper was read before the Mid-Year meeting of the American Petroleum Institute at Pittsburgh, May 22-24, 1934, where the author acknowledged his indebtedness to his associates in the petroleum engineering, research, statistical, legal and geological departments of Humble Oil & Refining Company for assistance and advice in the preparation of the paper and accompanying tables.

IT has long been assumed, among petroleum engineers, that in the development of an oil field, maximum ultimate recovery results from a maximum density of producing wells: that is to say, the larger the number of producing wells per unit area, the greater the ultimate recovery of oil from a given field. Cutler, for example, in a classic analysis of producing practice in the United States,[1] concluded that quadrupling the number of wells per unit area doubled the ultimate production from that area.

It is the thesis of this paper that greatest ultimate recovery results, not from closest well spacing, but, on the contrary, greatest ultimate recovery results from relatively wide spacing, as compared with common producing practice in this country. There are other advantages, of course, in spacing wells widely. These advantages have often been noted and some discussion of them will follow, but the real theme of this argument is the fact, not so generally realized, nor even generally accepted, that actually more oil is recovered from the typical oil field by wide spacing of wells (within reasonable limits), than by the extremely close spacing which the producing industry has accepted as good practice in the past.

The secret (if it be a secret) of obtaining the largest possible recovery from an oil field reservoir lies in making the most efficient use of the so-called reservoir energy of that field. Reservoir energy is the principal agency and practically the only agency for expelling oil from the pore-spaces of a natural reservoir into the wells and for lifting oil through the wells to the surface. Reservoir energy is susceptible of rapid and premature depletion and it was in fields of this type that Cutler made his studies. In common producing practice, reservoir energy has often been carelessly and wastefully depleted, or permitted to escape from control, long before the oil content of the reservoir was even near depletion. In such cases, ultimate recovery has been pitifully low; the oil that remains in the reservoir after the reservoir energy is depleted, or beyond efficient control, is not practically recoverable, except in negligibly small proportions. Many fields have reached a stage of exhaustion with more than one half of their original oil content still left in the reservoir, not to be recovered at a reasonable cost; some fields now practically exhausted still contain as much as 90 percent of their original store of oil.

Reservoir energy consists, of course, of (1) gas and gas pressure, either gas dissolved in the oil or gas free of oil in the higher portions of the reservoir above the oil, or of both dissolved and free gas, and (2) of the hydrostatic pressure of edge and bottom water in the lower portions of the reservoir below the oil. Commonly, the pressure on the gas and oil confined in a reservoir above the water is equal originally to the hydrostatic head of the water. Commonly, too, it is sufficient under proper control to produce most of the oil originally present in the reservoir. In reservoirs where gas or gas presure is deficient for this purpose, the pressure of the confining water, if properly controlled, often can be utilized to wash from the pore-spaces and lift through the wells most of the original oil content of the reservoir. If control is lacking and the water advances unevenly, much oil is flooded or sealed off and lost for all practical purposes. No petroleum engineer will deny the essential validity of these statements.

Why, then, if reservoir energy sufficient to produce practically the whole oil content of a reservoir is available to us, have we so often left most of the original oil content in the reservoir in our past experience as oil producers? That we have done so is not open to question. Numerous investigations by the Bureau of Mines confirm this fact. A committee of the American Petroleum Institute[2] years ago found that about four barrels of oil had been left in the ground for every barrel extracted therefrom. The answer is, of course, that in the past we have failed generally to control and utilize properly our reservoir energy. Under formerly prevailing methods of production, wells were drilled as closely and as rapidly as possible and were produced at as high a rate as possible, with no intelligent consideration of the function of gas and water pressure in bringing oil out of the reservoir. We drilled too many wells and we produced them with improper control.

Pressure Control Difficult With Close Spacing

We come then to the crux of the problem with which this paper is concerned; namely, a wider spacing of oil wells in the interest of a greater ultimate recovery of oil from natural reservoirs. If the record is analyzed, it becomes impossible to escape the conclusion that an insuperable obstacle in the way of efficient control and utilization of reservoir pressure has always been the excessive num-

[1] Cutler, U. S. Bureau of Mines Bulletin 228, August, 1924.
[2] Report of the Committee of Eleven, 1926, McGraw-Hill, New York.

ber of wells drilled into the reservoir. As a matter of fact, once a sufficient number of wells to permit the efficient drainage of oil from the reservoir has been drilled, then the difficulty of control and utilization of reservoir energy mounts in direct proportion as additional wells are drilled. Practically maximum efficiency in control and utilization of reservoir energy becomes impossible if wells are too closely spaced, and the difficulty of control and utilization increases in direct ratio with the number of wells in excess of the minimum requirements. One has only to look about him to realize the truth of this assertion. Control in East Texas is difficult: almost in direct proportion as the number of wells increases. Utilization of reservoir energy in Oklahoma City became increasingly less efficient as the number of wells there became greater. Experience has amply demonstrated that conservation of reservoir energy cannot be achieved once a field becomes too densely drilled.

Many wells, therefore close spacing of wells, make not for increased recovery as has been contended in the past: on the contrary, many wells and close spacing defeat efficient production practices and therefore diminish ultimate recovery.

Formula for Spacing Difficult

It becomes pertinent, at this point, to inquire what density for producing wells in the average oil field is appropriate to permit efficient extraction of oil from the reservoir, and at the same time not to complicate the problem of controlling and utilizing efficiently the reservoir energy of that field. If a formula were to be written by which the optimum well spacing pattern for a given field could be calculated, it would necessarily take account of a number of factors such as sand thickness, sand permeability, gas-oil ratios, oil gravity and viscosity, reservoir pressures and temperatures, rates of production desired, producing life of the field, etc., etc. To set up such a formula is outside the scope of this paper. Moreover, for the purpose in hand, it is unnecessary because a cursory examination of recently developed oil fields will demonstrate the essential point to be made, which is that well spacing may be much wider than the producing industry is accustomed to adhere to, without any sacrifice in ultimate recovery. Indeed it is already established that such wider spacing actually increases recovery.

Table No. 1 shows, among other data, the number of acres per producing well in a number of recently developed fields. It will be seen at once that efficiently developed fields are currently being exploited with as few as one well to each 37 acres of productive territory. The average for these six fields is nearly 20 acres per well. The larger part of the East Texas field, where the average density is brought down to nine acres per well by reason of close drilling on small tracts, is adequately and efficiently developed with one well to from 15 to 20 acres. Compare these densities with those of older fields such as Powell with one well to each 2.7 acres, Luling with one well to 3.8 acres, Goose Creek with one well to 1.4 acres, and Orange with one well to 1.0 acre. The tendency toward wider spacing becomes apparent. Yet no one doubts that efficient recoveries will be obtained in these new fields with a relatively wide spacing of wells.

Evidence at Yates

That a high recovery of oil is possible with widely spaced wells is not merely a technical theory is already amply demonstrated. Experience has proven the validity of the contention. A case in point is the Yates field, the oldest major field to have been efficiently controlled since discovery. This field has had only one well drilled on the average to each 40 acres of productive area. Much of it is drilled one well to one hundred acres. It has already produced 30 percent of its estimated total of recoverable oil, yet 95 percent of its current production is still flowing naturally. Its reservoir pressure is still 78 percent of its original value. Wells drilled recently, eight years after the field was discovered, show all the producing potentialities of the best wells drilled in the early development of the field.

Eloquent and incontrovertible evidence of the increased ultimate recovery obtainable by the control and efficient utilization of reservoir energy, such as can be had in fullest degree only if wells are widely spaced, is revealed by an experiment in repressuring an old oil field near Olney in Archer County, Texas. This field, including 60 acres, had been exploited to exhaustion through 25 producing wells. The well density, therefore, was one well to 2.4 acres. After abandonment, the old field was taken over and the reservoir energy was restored through repressuring with gas. With the reservoir energy restored, oil production was again initiated, controlling reservoir energy

Table No. 1

	Yates	Sugarland	Thompsons	Conroe	Van	East Texas
Estimated Recoverable Reserve, bbls.*	599,783,000	86,123,000	165,970,000	601,000,000	357,000,000	2,100,000,000
Ultimate Well Density: acres per well	37	14	18	18	7	5
Production Rate, bbls./day						
Allowable, April 25, 1934	46,500	6,000	12,000	53,000	42,500	462,965
Maximum	135,000	12,500	17,500	86,000	54,000	1,200,000
Estimated Efficient Rate	62,500	12,000	20,000	75,000	47,500	375,000
Barrels per Day per Million Barrels Reserve						
At Allowable, April 25, 1934	78	70	73	88	119	223
At Maximum Rate	225	145	105	143	151	272
At Efficient Rate	104	140	120	125	129	178
Total Years Productive Life						
At Allowable, April 25, 1934	35	39	38	31	23	12
At Maximum Rate	12	19	26	19	18	5
At Efficient Rate	26	19	23	22	21	15

*Reserve figures used are in substantial agreement with testimony presented before Texas Railroad Commission.

Table No. 2

		Estimated Ultimate Gross Prod. Bbls.	Gross Prod. to Jan. 1-34 Bbls	Gross Reserve Jan. 1-34	Estimated Total Ultimate Oil Wells	Estimated Gross Ult. Prod. Per Acre Bbls. per Acre	Estimated Ultimate Cost Dollars Per Bbl.			Ultimate Acres Per Well
							Drilling	Production	Total	
Under 15,000 Bbls. per Acre	Judkins	17,405,000	8,943,000	8,462,000	91	5,000	.178	.15	.328	40
	Greta	50,000,000	1,217,000	48,783,000	220	12,000	.156	.198	.354	19
	Church & Fields	62,250,000	56,244,000	6,006,000	234	14,000	.201	.186	.387	19
	McCamey	30,871,000	25,336,000	5,535,000	376	4,000	.332	.205	.536	19
15,000 to 30,000 Bbls. per Acre	Hobbs	175,000,000	40,984,000	134,016,000	270	16,000	.110	.135	.245	40
	East Texas	2,100,000,000	466,696,000	1,633,304,000	22,500	19,000	.158	.135	.293	5
	Winkler	215,000,000	172,163,000	42,837,000	658	18,000	.196	.129	.324	18
	Refugio	38,500,000	28,967,000	9,533,000	249	21,000	.539	.325	.864	8
Over 30,000 Bbls. per Acre	Yates	599,783,000	179,510,000	420,273,000	475	34,000	.012	.103	.114	37
	Thompsons	165,970,000	9,906,000	156,064,000	165	55,000	.033	.10	.133	18
	Sugarland	86,123,000	18,851,000	67,272,000	81	74,000	.043	.10	.143	14
	Van	357,000,000	58,127,000	298,873,000	530	97,000	.043	.135	.178	7
	Conro	601,000,000	24,104,000	576,896,000	970	34,000	.050	.150	.200	18
	Darst Creek	70,000,000	30,402,000	39,598,000	285	43,000	.109	.162	.271	6
	Powell	112,500,000	109,352,000	3,148,000	976	43,000	.242	.301	.543	3
	Luling	70,000,000	59,037,000	10,963,000	599	31,000	.252	.305	.557	4
	Goose Creek	84,602,000	72,022,000	12,580,000	768	79,000	.393	.42	.813	1
	Orange	33,500,000	31,187,000	2,313,000	270	84,000	.527	.379	.906	1

and utilizing only one producing well for each 7.5 acres of productive area. The exploitation still is in progress but in a period of 28 months an additional volume of oil, equal to 30 percent of the total ultimate production under old methods, has been recovered.

Control and efficient utilization of reservoir energy, then, make possible increased ultimate recoveries from oil fields, and a relatively wide pattern of well spacing is essential to the fullest control and utilization of reservoir energy. Too many wells, too close spacing interfere with, if they do not defeat, the control and utilization of reservoir energy.

But other evils flow out of dense well patterns in oil fields. Table No. 2 presents data on a number of oil fields, and compares well density to estimated total production cost. The fields are divided into three groups, according to the ultimate recovery per acre. The fields in each group are listed in the order of increasing production cost. It is interesting to observe that with but few exceptions, the production cost is greater in the densely drilled fields.

Drilling Cost Per Barrel

Drilling costs per barrel of oil to be produced were twice as high in the Winkler County pool (uncontrolled) in West Texas as they were in the Hobbs field (controlled) in New Mexico, in spite of the fact that individual wells in the Hobbs pool on the average cost nearly twice as much to drill as individual wells in the Winkler County pool. Drilling costs at Powell, Texas, were 24 cents per barrel, whereas at Van, Texas, they were only four cents per barrel. In the East Texas field, poorly controlled, some 22,500 wells may ultimately be drilled (13,000 are already completed), whereas 5000 wells would serve more efficiently to recover the oil in that field. In other words, drilling costs in the East Texas field will be about 16 cents per barrel, whereas they might better have been as low as three cents per barrel. This useless expenditure of $200,000,000 for drilling in East Texas represents an added burden of two million dollars per month on the field throughout its entire productive life. Compare these easily attainable drilling costs in controlled fields with actual costs in uncontrolled fields of similar depth and productivity, such as the Orange, Texas, field where drilling costs alone amounted to 50 cents per barrel recovered. Drilling costs are paid in the last analysis by the public which buys gasoline and are therefore a matter of public concern.

Drilling costs, however, unnecessarily high as they are in uncontrolled fields, are not the most important evils that come from lack of control. In the East Texas field the scourge of overproduction, with its train of low prices, with severe losses to operators and royalty owners alike, its "hot oil" racket, and chaos for the whole oil industry, has arisen largely because of over-development by drilling. The equally indefensible policy of fixing the allowable for a field on a "well potential" basis, with the resultant ridiculously low allowable per well has grown out of the situation that no intelligent control of well spacing has been exercised.

State Regulation

Considerable confusion has arisen in the minds of many people in the industry and of the conservation agencies as to the effect of the so-called law of capture upon the right of the state to regulate the spacing of wells. It is a generally accepted rule of law that in the absence of the exercise of the police power the owner of a well is entitled to produce through his well the oil that will enter same, even though such oil or a part thereof may have been produced from underneath adjoining lands. The reasons assigned for this rule have been varied. Whatever may have been the reasons assigned, it has a sound basis as a rule of convenience due to the inability of a person to determine accurately the source of oil entering the well. This rule of convenience is applied in those states, such as Texas, where the fundamental rule of property is that oil and gas are owned in place, the owner of the surface in the absence of constructive severance owning all of the oil and gas in place beneath the surface. It is also applied in those states, such as Oklahoma, in which the rule of

property is that the owner of the land owns his proportionate part of the oil in the common reservoir underlying his land and other lands. It is now well established that the state, in the exercise of the police power for the prevention of underground physical waste and for the prevention of fire hazards, may regulate the spacing of wells.

Bass v. Railroad Commission of Texas, 10 S.W. (2d) 589;

Oxford Oil Co. v. Atlantic Oil Producing Co., 16 Federal (2d) 639; 22 Federal (2d) 597;

State v. Jarmon, 25 S.W. (2d) 936.

The Supreme Court of Kansas has held that a regulation prohibiting the drilling of an oil well within 100 feet of a railroad right of way was valid, even though by reason of the size and shape of the tract adjacent to the railroad right of way the regulation prevented any operations for oil or gas upon the land.

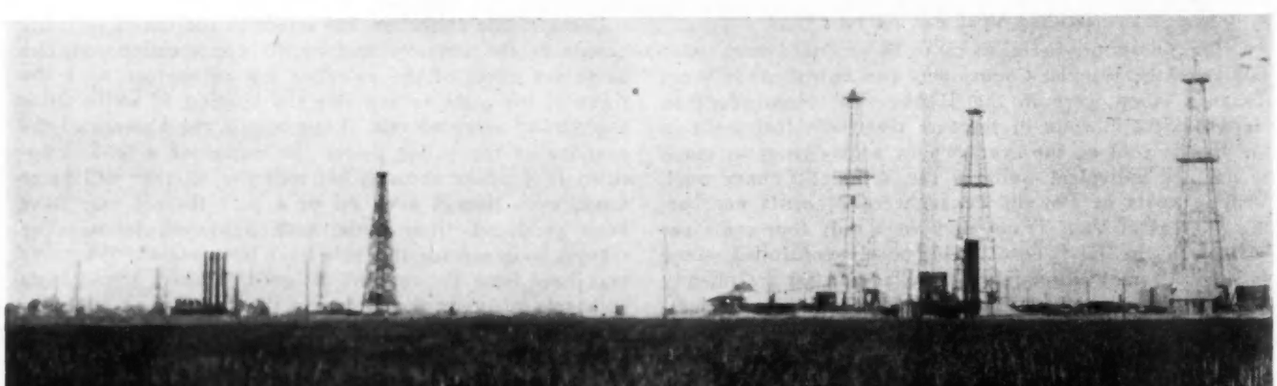
Winkler v. Anderson, 177 Pacific 521.

In Marrs v. City of Oxford, 24 Federal (2) 541, 32 Federal (2d) 134, a United States District Court and a United States Circuit Court of Appeals have held that the police power may be exerted to prevent the drilling of more than one well upon a block in a city and may require the pooling of the interests of all lot owners in the block with this in view. The United States Supreme Court denied a writ of certiorari, thus approving this holding. In some states the conservation laws are clearly broad enough to authorize the promulgation by the conservation agency of spacing rules and regulations. This is true in Texas. Where such statutes are in force, the spacing rules are valid if they are reasonable under the facts existing, having in view the purpose of preventing or lessening fire hazards and preventing the physical waste of oil or gas.

The so-called rule of capture is predicated on the idea that offset owners have the equal oportunity to recover the oil and gas underneath their several tracts of land by the drilling of such number of wells thereon as will result in the production therefrom of the oil thereunder. When the state intervenes in the public interest or in the interest of the protection of correlative rights of the several owners in the pool and restricts the freedom of action of either of such offset owners or of both, by regulating the location and number of wells that may be drilled on the several tracts or the rate of flow at which the wells drilled thereon may be operated, the offset owners are no longer free to protect themselves. If before the regulation they had the equal opportunity to recover the oil which under the fundamental rule of property belonged to them, then the state in exercising the police power has the obligation upon it to seek as far as may be to afford such offset operators the equal opportunity under the rule to recover the oil and gas underlying their several tracts. Stated differently, the allowable production from the several tracts must be so allocated that the several owners will be given the equal opportunity to recover the oil under their respective tracts of land, taking into consideration the number of wells and the spacing of same and the factors that determine the recoverable oil and gas under each tract. If wells are uniformly spaced, this becomes relatively easy. If wells are not uniformly spaced, it becomes more difficult but not impossible. The reasonableness of the spacing program adopted by the conservation agency depends not only upon the distance at which wells are required to be spaced but also upon the question as to whether or not as between the several owners in the oil pool the correlative rights of each under the operation of the fundamental rule of property are protected; that is to say, upon whether or not each is given the equal opportunity by the operation of the rule to recover the oil which is his. From the above, it will be seen that when the police power is exerted to control spacing of wells and rate of flow therefrom, the so-called law of capture as such passes out of the picture. The state by tying the hands of one or more parties has destroyed the reason lying back of the rule; that is, that each offsetter has the equal opportunity to recover the oil belonging to him. The race is no longer to the swift; the victory in battle is no longer to the strong. The state has hobbled the swift; it has weakened the arm of the strong. But its purpose was not to prevent either party from enjoying that which was his. Its purpose was to prevent waste and in preventing waste it must preserve to each the equal opportunity to recover that which is his. This can only be done by allocating allowable production in such way as to bring about such result.

In conclusion, it may be repeated that wider well spacing will yield greater ultimate recoveries from oil fields than the American producing industry has enjoyed heretofore, but it may be added, with equal validity, that wider well spacing will go far toward relieving the producing industry of some of its most sinister present ills.

The author is indebted to his associates in the petroleum engineering, research, statistical, legal and geological departments of Humble Oil & Refining Company for assistance and advice in the preparation of this paper and accompanying tables.



Mountain View Field in California

MARKETS ~ STATISTICS

Refined Oil Prices Take Sudden Jump. Favorable Legal Developments Plus Concerted Buying Responsible.

Refined Oil Markets Show Pronounced Improvement

THE markets for petroleum products improved decidedly during the past week. There were noteworthy increases in gasoline prices in East Texas, and gains for that product were also made in the rest of the Mid-Continent and on the Pacific coast.

The market strength was attributable to various factors. Possibly of greatest importance among them was the buying of substantial quantities of excess or distress gasoline by the integrated companies in compliance with request of the oil code administration.

Prospects of more effective regulation of crude oil production in consequence of a federal court decision at New Orleans was another influence on the side of a firm market. The decision upheld federal control of the industry under the petroleum code, sustaining powers of federal agents to regulate intra-state as well as interstate activities in producing, refining and transporting oil. In so far as the Pacific coast was concerned, another price stimulating influence, meanwhile, was the working out of a marketing agreement which will be inaugurated under authority of the oil administration if and when officially approved by the government.

The long-fought California gasoline price war ended during the week. Prices were increased, and it was hoped that they would rise still higher if and when the marketing agreement became effective.

East Texas Prices Rise

Wholesale gasoline prices in the East Texas refining district were buoyant, maintaining a steady upward movement during the week and rising to the highest levels of the year. The new quotations were among the best which have ever prevailed during the several years' history of the refining area.

Third grade gasoline, principal product of the district, had worked up by May 23 to an average price of 4⅛ cents a gallon from only 3⅝ cents a week earlier. At the beginning of May the material was selling for 3½ cents. The previous 1934 high on third grade in East Texas was 3¾ cents, established April 15, and the year's low was from 2⅞ to 3 cents, in effect March 20, when crude production control was at a low ebb.

Middle grade and first grade gasoline at East Texas refineries had risen by the middle of the past week to 4½ and 4¾ cents a gallon, respectively, each having come up a quarter cent within a week.

In North Texas, Oklahoma, and Kansas, likewise, gasoline prices were on the up grade, although increases were smaller. Group three quotations at the middle of the week were one-eighth cent higher than a week before for each grade, third grade having risen to 4¼ cents a gallon, middle grade to 4¾ cents, and first grade to five cents.

Low prices previously prevailing on East Texas gasoline precipitated retail price wars in the metropolitan areas of northern and southern Texas several weeks ago. The wars centered largely around quotations on third grade, and involved major as well as independent stations. The third grade material went in Fort Worth, Dallas, and Houston, to 11 cents, and in a few instances to 10 cents, a gallon, including five cents taxes. Termination of these abnormally low prices within a short time was hoped for in consequence of the strength which had developed in the wholesale prices.

"Hot" oil production in East Texas was estimated late last week to be still averaging in excess of 50,000 barrels daily, but with the federal government free to cooperate in oil law enforcement in consequence of the New Orleans decision, it was generally anticipated that production and refining of illegally produced and underpriced crude would immediately begin declining.

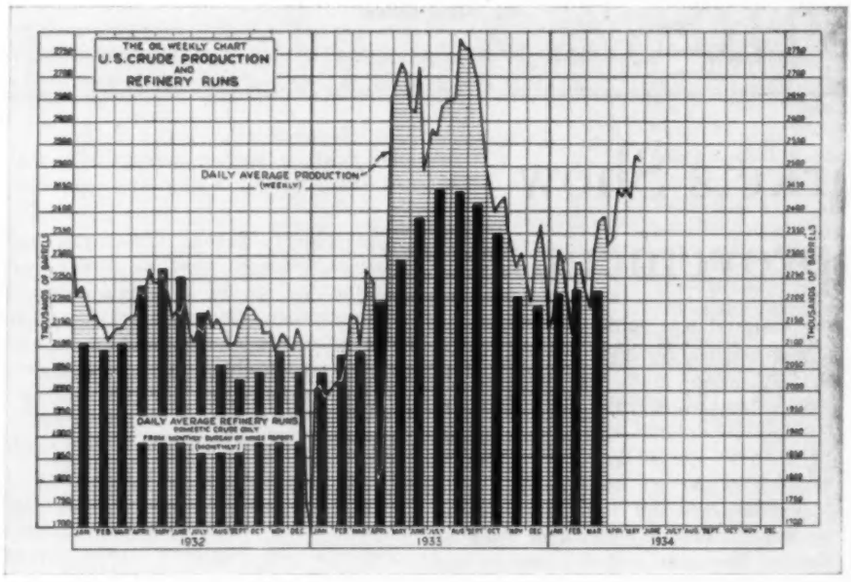
THE OIL WEEKLY
Estimated Average Daily Production of Crude Oil, Barrels

District or State	Week Ending May 26	Week Ending May 19
TEXAS—		
Texas Panhandle	59,000	55,650
North and West Central Texas	83,000	84,000
West Texas	140,400	140,400
East Central Texas	50,000	49,500
East Texas Field	476,000	474,000
South Texas	48,000	48,000
Texas Gulf Coast	171,500	172,000
Total Texas	1,027,900	1,023,550
OKLAHOMA—		
Oklahoma City	177,025	198,850
Seminole Area	129,100	124,700
Tatums	6,875	7,150
Lucien	7,750	9,100
Others	190,350	188,800
Total Oklahoma	511,500	528,600
LOUISIANA—		
North Louisiana	25,400	25,700
Louisiana Gulf Coast	57,000	56,000
Total Louisiana	82,400	81,700
ARKANSAS	30,050	30,000
KANSAS—		
Ritz-Canton	14,400	14,500
Voshell	8,950	8,250
Nikkel-Hollow	16,200	16,950
Sedgwick	8,140	7,500
Others	85,110	81,500
Total Kansas	132,800	128,700
CALIFORNIA—		
Long Beach	63,500	65,500
Santa Fe Springs	39,300	41,500
Huntington Beach	44,000	44,000
Dominguez	15,300	16,300
Inglewood	7,400	7,600
Ventura Avenue	30,000	31,000
Seal Beach	7,200	8,500
Midway-Sunset	54,000	56,500
Elwood	10,500	12,500
Kettleman Hills	60,500	54,500
Playa del Rey	8,800	9,300
Others	130,500	145,400
Total California	480,000	492,600
MOUNTAIN STATES—		
Wyoming	31,500	32,000
Montana	7,150	7,000
Colorado	3,100	3,000
Total Rocky Mountain States	41,750	42,000
NEW MEXICO	45,800	46,000
EASTERN STATES	99,650	99,500
MICHIGAN	31,000	31,000
Total United States	2,482,850	2,503,650

Production Above Allowable But Under Revised Quota

UNITED STATES crude oil production declined last week about 21,000 barrels from the previous week's daily average, but was still a long way above the national allowable as fixed by the oil code administration. The output was apparently not particularly excessive, however, as it was well under the new federal allowable which will be placed in effect June 1.

The nation's crude output for the week ending May 26 averaged 2,482,850 barrels daily, compared with 2,503,650 barrels per day the week before, and a national allowable of 2,366,200 barrels. Beginning June 1, however, the



United States total allowable will be 2,528,300 barrels daily.

Texas, Oklahoma, Kansas and California, the four leading oil producing states, were all above their allowables, but each was within or practically within the state quota which is shortly to become effective.

Texas' output of 1,027,900 barrels daily was several thousand barrels more than the previous week. It compared with an April-May federal allowable of 980,700 barrels and a June allocation of 1,032,300 barrels per day. The above figure on Texas production does not include "hot" oil. Most of the state's illegal production is in East Texas, and for that area it was estimated last week to be averaging around 50,000 barrels daily, although a decline seemed likely to materialize shortly in consequence of upholding of the NIRA oil code and of federal agents' oil control activities through the recent federal appeals court decision at New Orleans.

Oklahoma production dropped for the new week to 511,500 barrels daily from 528,600 barrels. The state's allowable has been 476,400 barrels daily, but is scheduled to be increased to 511,700 barrels daily.

Kansas crude output rose for the week of May 26 to 132,800 barrels daily from 128,700 barrels, and was therefore not only above the existing 122,100-barrel federal agency allocation but also in excess of the new quota of 130,300 barrels per day.

California production dropped to 480,000 barrels a day from 492,600 barrels, and thus approached materially nearer the April-May federal allocation of 462,500 barrels daily, and was well under the June 1 allowable of 500,300 barrels.

How Production Compares with Federal Allocation

	Allocation April	Week Ending May 26[1] Daily Average		4 Weeks, May 19[2] Daily Average	
Arkansas	32,300	30,050	−2,250	30,600	−1,700
California	462,500	480,000	+17,500	482,550	+20,050
Kansas	122,100	132,800	+10,700	129,750	+7,650
Louisiana	72,400	82,400	+10,000	79,950	+7,550
Texas	980,700	1,027,900	+47,220	1,017,750	+37,050
Oklahoma	476,400	511,500	+35,100	522,150	+45,650
New Mexico	45,800	45,800		45,900	+100
Rocky Mountain	43,100	41,750	−1,350	41,050	−2,050
Appalachian States	99,600	99,650	+50	99,100	−500
Michigan	31,300	31,000	−300	30,400	−900
United States	2,366,200	2,482,850	+116,650	2,479,200	+113,000
Imports crude and fuel oil				143,893	
Crude to Stills[3]				2,575,000	

[1]Oil Weekly estimate for current week. [2]A. P. I. estimate.

Marketing Plan Adopted By California Group

Los Angeles.—California refiners and marketers with only one exception this week reached an agreement on a marketing plan which is in effect a contract with the government through Secretary Ickes calling for the sale of all similar grades of gasoline at same identical by all companies.

A large delegation left Friday for Washington to present the matter for approval, which is to become effective when approved by the president.

The gasoline war which has been in effect for a number of weeks came to an end May 23 when all grades of gasoline was raised two cents a gallon. It is expected another two-cent raise can be expected with presidential approval of the new marketing plan.

Petroleum Imports Above Levels of Previous Weeks

IMPORTS of crude and refined oils at principal United States ports for the week ended May 19 totaled 1,131,000 barrels, a daily average of 161,571 barrels, compared with 77,571 barrels daily the previous week and 147,893 barrels daily for the four weeks ended May 19.

The 1,131,000 barrels included 70,000 barrels deceived at Baltimore, 801,000 barrels at New York, 178,000 barrels at Philadelphia, and 82,000 barrels at other Atlantic coast ports; and consisted of 869,000 barrels of crude oil and 262,000 barrels of fuel oil.

The above figures include all oil imported whether for domestic use or in bond for later re-export, but separation is not available for weekly statistics. According to the Bureau of Mines,

Crude Runs to Stills; Finished and Unfinished Gasoline; Gas and Fuel Oil Stocks, and Cracked Gasoline Production, Week Ended May 19, 1934

(Figures in thousands of barrels of 42 gallons each)

DISTRICT	Daily Refining Capacity of Plants			Crude Runs to Stills		Stocks of Finished Gasoline			(a) of Unfinished Gasoline	(b) Stocks of Other Motor Fuel	Stocks of Gas and Fuel Oil	Daily Charging Capacity of Cracking Units			Cracked Gasoline Production Average
	Potential Rate	Reporting		Daily Average	% Operated	At Refineries	Bulk Term., in Trans. & Pipe Lines	Total at Refys., Term., etc.				Potential Rate	Reporting		
		Total	%										Total	%	Daily
East Coast	582	582	100.0	478	82.1	6,367	10,684	17,051	1,222	191	7,003	496	471	95.0	75
Appalachian	150	140	93.3	105	75.0	1,175	462	1,637	312	157	824	69	69	100.0	23
Ind., Ill., Ky.	446	422	94.6	340	80.6	6,416	2,425	8,841	1,235	48	2,783	325	308	94.8	93
Okla., Kans., Mo.	461	386	83.7	253	65.5	3,623	1,886	5,509	801	566	3,076	256	234	91.4	60
Inland Texas	351	167	47.6	100	59.9	1,265	114	1,379	320	313	1,761	82	66	80.5	27
Texas Gulf	566	552	97.5	488	88.4	4,362	301	4,663	2,679	170	5,350	358	349	97.5	81
Louisiana Gulf	168	162	96.4	113	69.8	570	640	1,210	224	.....	1,049	71	71	100.0	21
North La.,—Ark.	92	77	83.7	49	63.6	239	30	269	62	30	473	41	38	92.7	9
Rocky Mountain	96	64	66.7	31	48.4	1,270	.....	1,270	163	43	692	46	42	91.3	8
California	848	822	96.9	473	57.5	10,418	2,114	12,532	895	2,832	79,885	209	209	100.0	54
TOTALS WEEK: May 19, 1934	3,760	3,374	89.7	2,430	72.0	35,705	18,656	54,361	7,913	4,350	102,896	1,953	1,857	95.1	451
May 12, 1934	3,760	3,374	89.7	2,308	68.4	36,318	18,975	55,293	8,296	4,350	103,176	1,953	1,857	95.1	457

Below are set out estimates of crude Runs and Cracked Production on B. of M. Basis for Week May 19, 1934, compared with May 1933 Bureau figures.

Estimate B. of M. Basis May 19, 1934	2,575		480
Estimate B. of M. Basis May 12, 1934	2,450		495
U. S. B. of M. May 1933 Daily Average Crude Runs	2,398	U. S. B. of M. May, 1933 Daily Average Cracked Prod.	529

(a) Amount of unfinished gasoline contained in naphtha distillates.
(b) Estimated. Includes unblended Natural Gasoline at Refineries and Plants; also blended Motor Fuel at plants.

oils imported in bond during the six months ended March 31, 1934, averaged about 20,000 barrels daily.

Receipts of California oil, crude and refined, at Atlantic and Gulf Coast ports for the week ended May 19 totaled 605,000 barrels, or 86,429 barrels daily, compared with 112,571 barrels daily the previous week and 78,357 barrels daily for the four weeks ended May 19.

The 605,000 barrels included 66,000 barrels received at Boston, 249,000 barrels at New York, 117,000 barrels at Philadelphia, and 173,000 barrels at other Atlantic coast ports; and consisted of 230,000 barrels of gasoline and 375,000 barrels of fuel oil.

Summary of Field Results During Past Week

State	Completions	Oil wells	Gas wells	Failures	Init. prod.
California	16	16	0	0	23,880
Kansas	14	6	0	8	2,886
Kentucky	9	4	0	5	205
Louisiana	15	6	0	9	3,193
Michigan	5	3	1	1	205
Montana	3	3	0	0	322
Ohio	31	10	11	10	141
Oklahoma	36	22	2	12	7,151
Texas	202	149	5	48	644,363
W. Virginia	3	2	0	1	0
Wyoming	2	2	0	0	9
Total	336	223	19	94	682,255

Gross Production Tax Attacked in Court

Austin, Texas.—Test of the constitutionality of the new Texas gross production tax law began in Austin May 25 when a three-judge federal court took submission of the case filed by the estate of Mrs. W. M. Cook. The suit questions the right of the state to collect a tax from royalty owners, as producers of oil, and holding them liable for the tax on their share of the production.

Remarks from the bench by Judge J. C. Hutcheson led observers to believe that the court might consider the royalty owner as a producer, that the actual producer acted only as an agent in producing a share of the oil for the royalty owner, who would then be liable for the tax on that share of the oil produced for him. The court also intimated that the probable cause of action for the royalty owner, if any, lay in a suit against the actual producer, seeking to recover the amount of tax paid.

Attorneys for the state were allowed 15 days in which to file briefs.

Ponca City, Okla.—The regular monthly meeting of the Petroleum Motor Transport Association was held in Ponca City on May 25 as guests of Continental Oil Company. A large number of delegates motored over for the meeting from Tulsa and other nearby points.

Comparison of Permits Granted for New Wells

State	Week ending May 26	Total this month	Total this year	Total this date last year	1933 year total
Arkansas	0	0	28	28	47
California	9	44	208	111	593
Louisiana	23	83	302	190	755
Kansas	22	94	377	207	682
Michigan	17	38	197	100	420
Oklahoma	32	174	865	383	1,315
Texas	156	1,188	4,065	2,206	7,845
Total	259	1,621	6,042	3,225	11,651

Politics May Dominate Commission Hearing

Austin, Texas.—The statewide proration hearing scheduled to be held in Austin May 28 may bring out interesting developments from two angles.

The railroad commission may have difficulty in fixing allowables for Texas oil fields in line with the recommendations of the federal government. A thorough airing of the recent changes in personnel of the commission which resulted in the curtailment of powers granted R. D. Parker, chief administrative officer, may result.

The new federal allocation recommended by Secretary Ickes would permit the production from Texas fields of 1,032,300 barrels per day during the month of June. On May 20 the allowable for the East Texas field totaled 478,661 barrels per day, assigned to 13,218 wells. This brought the state allowable to 1,036,414 barrels per day, a figure 4114 barrels per day above the federal recommendation.

The East Texas order, which allows the production of 5 percent of the hourly potential of all the wells in the field, continues to increase daily. During the past month at least 10 wells have been completed daily, on the average, which results in a daily increase in the allowable of some 300 barrels. By the time the new orders become effective on June 1, the allowable for that field will probably be 3000 barrels higher than the figure reported above.

In the past the commission has issued orders following each federal recommendation, which were usually below the amount assigned. This was done to take care of the East Texas increase.

If this procedure is continued when the new orders effective June 1 are promulgated, considerable revision will be required that will entail cuts in some of the fields. The commission will be faced with a serious problem in selecting these fields, as current allowables closely approximate localized market demands in those instances where they are greater than the actual marginal production.

In addition, two new fields, Angelita and Vanderbilt, will have to be given some allowance, and it is probable that the new deep sand area at West Columbia will be assigned an allowable separate from that now produced by other wells. A request is also on file for an increase in the South Government Wells field.

There is good reason to believe that operators will demand of the commission some explanation of the situation which resulted in R. D. Parker, administrative chief, being restricted to the East Texas field. Many of the oil men resent this action and have been quick to criticize the commission.

The events leading up to this question are:

April 1, the commission issued an order signed by Commissioners Smith and Thompson giving Parker full charge of the oil and gas division of the commission. Coupled with this power was the right to hire and fire any or all employees in this division and to make such expenditures for the enforcement of commission orders as he saw fit, within the limits defined by the statutes.

Commissioner Terrell, ill in a hospital, did not sign this order and it became known that he was opposed to the move, particularly that portion of it which gave Parker the right to hire and fire.

Commissioner Thompson at that time made public a letter he had written to Commissioner Smith, in which he demanded that this power be granted to Parker and that it include the entire state. He said that he was willing to agree to this plan, since the other commissioners would not grant these discretionary powers to Captain E. N. Stanley for the East Texas field alone.

April 17, the commission issued another order, the effect of which was to relieve Parker of all duties except in the East Texas field and returned to the commissioners the control of all employees except those in East Texas.

Commissioners Terrell and Thompson signed this order. At the time it was made public in Austin, May 17, Thompson stated that Commissioner Smith had urged him to sign and exhibited communications to that effect Commissioner Smith had made public a telegram sent to the other commissioners on May 16 in which he declared that he would not sign such an order. Smith had conferred with Parker in Dallas and quoted Parker as saying that he would resign if his powers were curtailed.

Rumors circulated freely that Parker would resign but he has remained on the job in the field and declared repeatedly that he proposed to work on his assignment of drying up "hot" oil, regardless of political controversies.

Hearings Held on Three Southwest Texas Fields

Austin, Texas.—Hearings on three new Southwest Texas fields, Vanderbilt, Angelita and Ceasar, were held before the Texas Railroad Commission Friday. Vanderbilt was the first field considered, and much of the testimony involved the spacing rule in the field, which calls for one well to 20 acres under emergency rules issued May 15. Representatives of the Encino Oil Company, discoverer of the field, feared townsite drilling might cause serious operating difficulties. They pointed out that a heavy gas sand had been encountered at 2570 feet, and expressed the fear that fire hazards would result if wells are spaced too close together. They announced that they were willing to pool townsite leases which they do not own, allocating profits and losses proportionately on an acreage basis. They would drill one well to 20 acres, or each nine blocks of the townsite.

The Angelita operators suggested that 25-acre units might be more practical in that field, as leases were on that basis, principally.

Ten-acre spacing was requested for the Ceasar field and operators testified that only one or two smaller tracts might be affected.

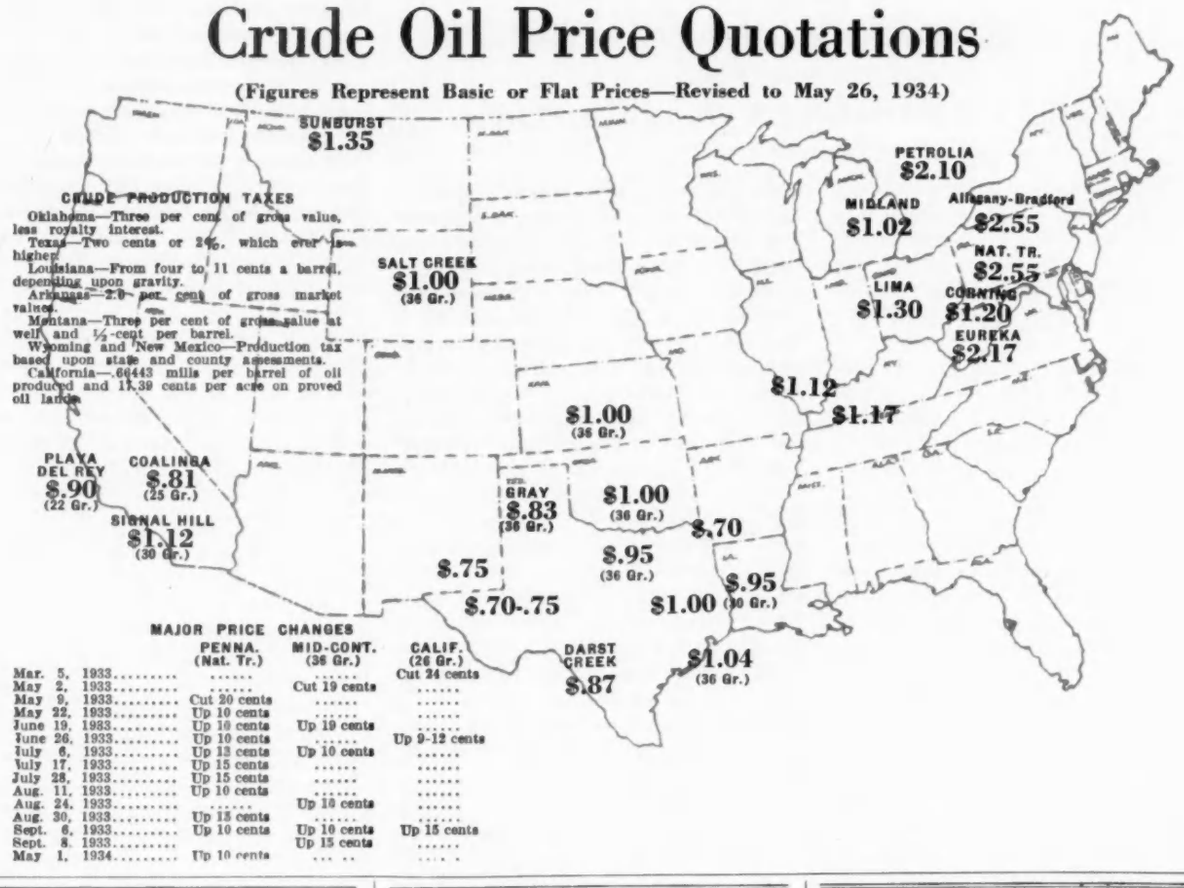
West Texas Crude Going To Canadian Refiners

San Angelo, Texas.—Humble Oil & Refining Company is shipping approximately 1000 barrels of West Texas crude daily via tank cars to the Highway Refining Company's plant at Regina, Canada. A portion of this export order is being filled from crude purchased by the former in the Big Lake field on contract. Facilities of the Reagan County Crude Oil Purchasing Company at Kemper station, located on the Santa Fe Railroad near the Big Lake field, are being used to load the tank cars.

Movement of West Texas crude via tank cars to Canadian plants has frequently occurred in the past, particularly the output of the McMillan pool, Runnels County, where a high gravity sweet crude is produced in limited quantities.

Crude Oil Price Quotations

(Figures Represent Basic or Flat Prices—Revised to May 26, 1934)



MAJOR PRICE CHANGES

	PENNA. (Nat. Tr.)	MID-CONT. (36 Gr.)	CALIF. (26 Gr.)
Mar. 5, 1933	.....	.....	Cut 24 cents
May 2, 1933	.....	Cut 19 cents	.....
May 9, 1933	Cut 20 cents	.....	.....
May 22, 1933	Up 10 cents	.....	.....
June 19, 1933	Up 10 cents	Up 19 cents	.....
June 26, 1933	Up 10 cents	.....	Up 9-12 cents
July 6, 1933	Up 13 cents	Up 10 cents	.....
July 17, 1933	Up 15 cents	.....	.....
July 28, 1933	Up 15 cents	.....	.....
Aug. 11, 1933	Up 10 cents	.....	.....
Aug. 24, 1933	.....	Up 10 cents	.....
Aug. 30, 1933	Up 13 cents	.....	.....
Sept. 6, 1933	Up 10 cents	Up 10 cents	Up 15 cents
Sept. 8, 1933	.....	Up 15 cents	.....
May 1, 1934	Up 10 cents	.....	.....

DISTRICT	Low Grav.	Dif.	High Grav	Date
Oklahoma-Kansas	28—$ .84	2¢	40—$1.08	9-29-33
N. and N.-C. Texas	28— .79	2¢	40— 1.03	9-29-33
Texas Panhandle				
Gray County	34— .79	2¢	40— .91	9-29-33
Carson-Hutchinson	34— .69	2¢	40— .81	9-29-33
West Texas				
Ector, Pecos, Wk'lr	*.75			9-29-33
Crane, Upton, Howard and Glasscock	*.70			9-29-33
East Texas	*1.00			9-29-33
Texas Gulf Coast				
Conroe	35— 1.09	2¢	40— 1.19	9-29-33
Tomball	*1.15			9-29-33
Cleveland	*1.00			1-11-34
†Goose Creek, Hull Liberty, Orange, Pierce Junction, Moss Bluff, Raccoon Bend, Sour Lake, Spindletop, Sugarland, West Columbia	Below			
Humble, Rabbs Ridge	20— .82	2¢	34— 1.12	9-29-33
South and SW Texas	Below			
Refugio (Light)	20— .82	2¢	34— 1.12	9-29-33
Refugio (Heavy)	.85			9-29-33
Saxet	*.85			9-29-33
Mirando	*.80			9-29-33
Pettus	*1.05			9-29-33
Salt Flat	*.87			9-29-33
Darst Creek	*.87			9-29-33
Arkansas				
El Dorado (Light) and Rainbow	29— .79	2¢	40— 1.03	3-17-34
Eldorado East Field and Smackover	*.70			9-29-33
North Louisiana	29— .79	2¢	40— 1.08	9-29-33
Urania	*.85-*.87			1- 1-34
South Louisiana	Below			
Lockport	20— .80	2¢	34— 1.10	9-29-33
	Below			
Iowa, Cameron Mds.	20— .70	2¢	34— 1.00	9-29-33
Rocky Mountain States				
Salt Creek	29— .84	2¢	40— 1.08	9-29-33

*All gravities—flat rate.
†Gulf Coast prices as posted by Humble Oil & Refining Company.

DISTRICT	Low Grav.	Dif.	High Grav.	Date
Elk Basin	$*1.17			9-29-33
Grass Creek (Light)	*1.17			9-29-33
Big Muddy	*1.01			9-29-33
Rock Creek	*1.02			9-29-33
Sunburst	*1.35			9-29-33
Lance Creek	*1.02			8-25-33
Osage	*.62			8-25-33
Cat Creek	*.45			8-25-33
Ponders	*.65			8-25-33
Hog Back, N.M.	*1.00			9- 8-33
Lea County, N. M.	*.75			9-29-33
Mid-West States				
Lima	*1.30			9-29-33
Illinois	*1.13			1- 5-34
Princeton	*1.13			1- 5-34
Western Kentucky	*1.17			9-29-33
California				
Signal Hill	14— .65	1¢	16—$ .66	9- 6-33
	17— .69	2¢	22— .84	9- 6-33
	23— .88	3¢	30— 1.09	9- 6-33
Seal B.,Alamitos Hts.	19— .65	3¢	20— .68	9- 6-33
	21— .72	4¢	22— .76	9- 6-33
	23— .81	4¢	26— .93	9- 6-33
	27— .98	4¢	30— 1.10	9- 6-33
Huntington Beach	14— .65	4¢	15— .69	9- 6-33
	16— .72	3¢	19— .81	9- 6-33
	20— .83	3¢	28— 1.07	9- 6-33
	29— 1.09	3¢	30— 1.12	9- 6-33
Inglewood	14— .65	4¢	16— .73	9- 6-33
	17— .76	4¢	18— .80	9- 6-33
	19— .83	4¢	20— .87	9- 6-33
	21— .90	4¢	22— .94	9- 6-33
	23— .97	4¢	24— 1.01	9- 6-33
Playa del Rey	14— .65	1¢	15— .66	9- 6-33
	16— .69	4¢	17— .73	9- 6-33
	18— .76	4¢	19— .80	9- 6-33
	20— .83	4¢	21— .87	9- 6-33
	22— .90	4¢	23— .94	9- 6-33
	24— .97	3¢	25— 1.00	9- 6-33
			26— 1.04	9- 6-33
Olinda-Brea Canyon	14— .6[illegible]	4¢	16— .7[illegible]	9- 6-33
	17— .76	3¢	28— 1.1[illegible]	9- 6-33
Athens-Rosecrans				
Domingues	23— .83	3¢	24— .86	9- 6-33
	25— .90	4¢	26— .94	9- 6-33
	27— .97	3¢	29— 1.04	9- 6-33
	30— 1.08	4¢	31— 1.12	9- 6-33
			32— 1.15	9- 6-33
Elwood (fob ship)	33— 1.03	3¢	37— 1.15	9- 6-33
Torrance	14— .65	1¢	15— .66	9- 6-33
	16— .69	3¢	20— .81	9- 6-33
	21— 83	3¢	26— .98	9- 6-33

*All gravities—flat rate.

DISTRICT	Low Grav.	Dif.	High Grav.	Date
Richfield	15—$ .65	2¢	16—$ .67	9- 6-33
	17— 70	4¢	20— .82	9- 6-33
	21— .85	4¢	22— .89	9- 6-33
	23— .93	4¢	24— .97	9- 6-33
	25— 1.00	4¢	27— 1.08	9- 6-33
	28— 1.11	4¢	29— 1.15	9- 6-33
Whittier-LaHabra	15— .65	3¢	18— .74	9- 6-33
	19— .78	3¢	24— .93	9- 6-33
Montebello	19— .65	1¢	20— .66	9- 6-33
	21— .69	3¢	22— .72	9- 6-33
	23— .76	4¢	24— .80	9- 6-33
	25— .85	4¢	26— .89	9- 6-33
Coyote Hills	16— .65	3¢	19— .74	9- 6-33
	20— .78	3¢	29— 1.05	9- 6-33
	30— 1.09	3¢	34— 1.21	9- 6-33
Santa Fe Springs	21— .72	4¢	22— .76	9- 6-33
	23— .79	4¢	25— .87	9- 6-33
	26— .90	4¢	28— .98	9- 6-33
	29— 1.01	4¢	30— 1.05	9- 6-33
	31— 1.08	4¢	33— 1.16	9- 6-33
	34— 1.19	4¢	35— 1.23	9- 6-33
	36— 1.26	4¢	38— 1.34	9- 6-33
New Hall, McKittrick, Kern River	14— .57		19— .57	9- 6-33
Midway Sunset, Elk Hills,Buena Vista Hills	17— .57	4¢	18— .61	9- 6-33
	19— .64	3¢	22— .73	9- 6-33
	23— .77	4¢	33— 1.17	9- 6-33
Lost Hills	17— .57	4¢	21— .73	9- 6-33
	22— .76	3¢	30— 1.00	9- 6-33
Coalinga	17— .57	1¢	18— .58	9- 6-33
	19— .62	3¢	21— .68	9- 6-33
	22— .72	3¢	25— .81	9- 6-33
Wheeler Ridge	17— .57	1¢	18— .58	9- 6-33
	19— .61	3¢	25— .79	9- 6-33
Kettleman Hills	33— .93	3¢	39— 1.11	9- 3-33
Pennsylvania				
Bradford	*2.25			4- 1-34
Sw Pa., Pipe Line	*2.22			4- 1-34
Eureka Pipe Line	*2.17			4- 1-34
Buckeye Pipe Line	*2.07			4- 1-34
Corning Grade	*1.20			9-11-33
Michigan				
Central Michigan	*1.20			9-30-33
Muskegon	*.70-1.00			12 31 32
Canada				
Petrolia	*2.10			9- 9-33
Oil Springs	*2.17			9- 9-33

*All gravities—flat rate.

President's Approval of Ickes Oil Control Bill Does Not Stop Fight

(*Continued from page 14*)

The Planning and Co-ordination Committee is in complete accordance with the aims of the legislation, other than the two-year limitation insisted upon by Representative Disney, it was declared by Judge Amos L. Beaty, chairman.

The reasons for the opposition to the limitation, he said, are the recent renewed drilling and exploration, which will probably result in huge additional oil reserves, and the expectation that production at the end of the two-year period will be as large as, if not larger than, at present. The two-year period is too short for a real test of federal control, he declared.

The state commissions are unable to cope with the problems of production, Judge Beaty explained; "they do not agree on their respective shares of the market, some contending for more than others are willing to concede.

"There can be no doubt of the power of Congress, directly or indirectly through such agencies as it may designate, to limit the quantity of oil that may move in interstate commerce," he held.

However, an attempt directly to control production might lead to difficulties as, for instance, if the State of Texas should invite producers to bring out oil in excess of production quotas and hold it for a year. This might be done if the state wanted to obtain more tax money or insure supplies for its institutions, and the federal government would be without authority to oppose such a course.

"It has become increasingly evident that only some authority national in its scope can satisfactorily regulate and control the production of oil in this country and imports of oil into this country," it was declared by H. B. Fell, executive vice president of the Independent Petroleum Association of America, appearing on behalf of that organization, the National Stripper Well Association and 17 other organizations.

No state regulatory body has ever attempted to analyze the national requirements for consumption, he pointed out, and this, with other factional, regional and political influences, has "made it painfully evident that the over-production of oil, which is national in character, could not be solved by any local or state action alone."

Pointing out that the industry itself has made several attempts to cope with the situation, without success, Fell declared "it is not because of any lack of understanding of the problems on the part of the oil industry that it thus turns to the federal government, but because there exists in this country, as in all other industries and in all departments of human life, a selfish fringe who lack social consciousness, whose moral viewpoint seems biased by self-interest and whose conduct has been characterized as criminal.

"We are not holding that the present bill is ideal. We do maintain, however, that the present bill is a practical method by which serious economic evils may be remedied, preventing the waste of this natural resource, insuring employment to large numbers of men engaged in the various processes of producing, refining and marketing petroleum and its products, and conserving the purchasing power of the oil-producing states."

"Hot" oil production in East Texas runs to 125,000 barrels a day, it was charged by W. B. Hamilton of Wichita Falls, chairman of the West Texas Chamber of Commerce oil committee, urging enactment of the bill.

Opposition Opened by Thompson

The fight against the legislation was opened by E. O. Thompson of the Texas Railroad Commission, who urged that opportunity be given for a fair trial of the Texas statutes.

The commission has 120 men in the East Texas field to enforce the law, he told the subcommittee, but explained that "the higher the price for oil the harder the enforcement." Recent legislation makes it possible now to punish violators effectively, and there are 2000 cases pending.

The commission has been co-operating fully with the federal government with the result that oil was so "scarce in Texas that it was being imported from California," Thompson declared.

Many opponents of the legislation never produced a barrel of oil illegally, it was declared by Elwood Fouts, Houston, Texas, in answer to Administrator Ickes' charge that the measure was being opposed by "hot" oil runners. He charged the legislation to be a "subterfuge" of the major companies to increase the price to the consumer.

The attack against the bill was continued May 22 by Mr. Fouts, who asserted the legislation would not be held constitutional because of its attempt to compel individuals to do things which are against their nature, and expressed the fear that the pending legislation would eventually lead to the nationalization of oil.

"Sentiment in the oil industry is against this bill," he told the subcommittee. "We are opposed to a dictator and we seriously object to being termed by the Secretary of the Interior as hot oil runners and thieves."

The legislation was also opposed by J. Edward Jones, New York royalty owner who was recently the star witness at the National Recovery Review Board's hearings on the oil code, who charged that an unnamed member of the Planning and Coordination Committee was a "hot" oil producer.

W. G. Williams of Fort Worth, also a major figure during the review board's investigation, declared that if the measure is adopted oil would become interstate commerce and the states would lose their right to levy taxes upon it.

Opponents of the legislation concluded their presentation with the testimony of Jack Blalock of Marshall, Texas, representing the Independent Petroleum Association of Texas, who issued a defi to the Secretary of the Interior to dictate to the state where it can drill wells on its own land.

Denominating the legislation an attempt at dictatorship, Blalock asserted "Americans abhor the idea of a dictator."

"There is no necessity for this bill," he contended. "The people behind it have failed in their efforts before the state legislatures during the last three years, and they now come to Congress to repair that failure. The oil people are prosperous. They are able to ride airplanes to Washington to obtain passage of this bill so they can make more money."

Carrying his fight into the enemy's cap, Blalock declared that 366,000,000 barrels of oil in storage is owned by 14 major companies. These stocks, it has been charged, have been built up from imports. The witness attacked Secretary Ickes' "hot" oil charges and preferred some of his own, alleging that while the "hot" oil production is but five percent in excess of the production allowable, imports—controlled entirely by the Secretary—are in excess of six percent of the import allowable, indicating that state regulation is more efficient than that of the federal government.

"Let's understand about 'hot' oil," he said. "It represents the difference between allowed production and market demand; it is the independent op-

erators reaching out for their part of the market. I do not represent any 'hot' oil runners, but I was glad to hear the Secretary of the Interior say the practice is not confined to Texas, but that it exists in other states.

"Let us talk less about 'hot' oil and more about 'hot' imports," he continued. "The state railroad commission has 48,000 wells to watch. The Secretary has but three ships to watch.

"Sponsorship of this bill grows out of a conspiracy on the part of the major oil companies to protect their investment in stripper wells," Blalock charged.

The East Texas Chamber of Commerce which, at a meeting he charged was "hand picked", voted in favor of the bill was declared to "want the oil bill because it puts money in their pockets."

Concluding his argument with a contention that the measure would be declared unconstitutional by the courts, Blalock cited an opinion rendered in 1926 by Chief Justice Hughes of the United States Supreme Court, then a practicing attorney before the Federal Oil Conservation Board, that under the power to regulate commerce, Congress has no constitutional authority to control the mere production of oil on other than Indian lands.

As the hearings were concluded, Senator Thomas of Utah, chairman of the subcommittee, announced that the proponents could file their rebuttal of opposing testimony in the form of a brief, to be submitted immediately with a view to permitting the making of a report to the Senate before the end of the week.

Hearings on the Disney version of the bill are expected to start before the House interstate and foreign commerce committee next week.

Refinery Control Statute Before Court June 13

Austin, Texas.—The constitutionality of the new Texas refinery control bill will be submitted to the Third Court of Civil Appeals at Austin June 13.

The case was brought by George L. Culver, Gladewater refiner, but was dismissed on a general demurrer by Judge J. D. Moore of the Ninety-eighth District Court of Travis County.

The Civil Appeals Court, following the setting, declined to certify to the Supreme Court questions concerning validity of the law, which would have resulted in a final decision of the question.

A decision from the appeals court, however, will probably be handed down before the summer recess of the court begins.

Control Bill Condemned *by Fouts At Hearing* As Unconstitutional

Washington.—After listing the concerns and individuals whom he represented, Elwood Fouts, Houston attorney, gave his version of opposition to Senate bill No. 3495 before the committee on mines and mining, May 21. He deplored the statement of Secretary Ickes to the effect that opponents of the measure are producers of illegal oil and stated that no client of his followed such practice. He likewise styled as a half truth the charge that opponents of the federal measure have in the past opposed measures before the Texas legislature. In proof of his contention that the Senate measure tends toward monopoly he cited the fact that it has the support of representatives of the major companies. Continuing he said:

"Those for whom I speak are actual producers of oil. While the number is small, they in truth represent the great majority of the unorganized and inarticulate class of independent oil producers who are unsubsidized and unable to make themselves heard because they are not financed or organized for so gigantic a struggle. The great majority of such producers are opposed to such a measure as this. However, my concern and their concern reaches much further than the immediate selfish interests of a profit out of the petroleum industry irrespective of the cost.

—Blank & Stoller

ELLWOOD FOUTS

"We think such a measure as this strikes at the very fundamental principle on which this government is built, that if the spirit of this bill could be successfully carried into valid legislation it would be destructive of every vestige of the reserve rights retained by the several states comprising this nation.

Bill Rewritten

"Some of you may have been a little surprised at the marked changes which Judge Beaty today told you were necessary to make such legislation valid. As a matter of fact, Judge Beaty or some other lawyer has seen that the Ickes' bill could not be sustained as constitutional. That is why this bill has been rewritten, and in all likelihood has been rewritten by Judge Beaty. He knew of no direct way to circumvent the plain language of Chief Justice Hughes, which with great vigor has been reaffirmed recently in the Champlin case by the Supreme Court itself when Judge Butler said that it was inconceivable that anyone should contend that producing oil constituted commerce.

"Fortunately Judge Beaty spoke from a prepared statement. His statement and proposal to you is that you cannot accomplish the purpose he and his friends, the major companies, desire in the manner proposed by Secretary Ickes, but he tells you that by indirection and subterfuge and under the guide of protecting interstate commerce you may reach the same conclusions. But I pause to ask you, what is the purpose sought to be accomplished? Am I not correct in stating that every speaker who has addressed you in behalf of the passage of this bill has with all of the impetus possible stressed to you the necessity for the passage and the purpose of the passage of this bill to be the stabilization and the salvation of the oil business? Am I not correct in stating that the proponents' sole message to you has been that unless this bill is passed, the great oil business will enter into a stage of chaos?

"The very opening sentence in Judge Beaty's statement is: 'For several years a kind of control over crude oil production has prevailed under state authority.'

"Further down on the first page of

his statement he says, 'The problem of the *petroleum industry* is much more difficult than that of other natural resource industries.'

"Again on page 3 of his statement he says: 'Many lawyers now entertain the opinion that congress has power to control the production of petroleum on private property within the states . . . My opinion is that the theory is unsound.'

"Again, 'Restriction of dumping and stabilization of markets are of vital importance.'

"Again he says, 'There would be no hope in restrictions applicable strictly and solely to interstate movements unless quotas for refineries as well as for producers should be established, and even then the plan would be incomplete and unworkable. An immediate and inevitable result would be intensified competition and lower prices in the large producing states, which as an *economic matter* would soon cut off movement into these states and thereby seriously affect that particular interstate commerce.'

"So you see, gentlemen, that the burden of his appeal is for you to do something to help out the oil business. I might pause at this point to ask whether he had in mind the passage of a measure sufficiently far-reaching to cut off all factors of an *economic nature*. I am wondering if the measure which he would have you pass could be so far-reaching as to make criminals of all of the owners of oil properties in the state of Texas if by concert after the passage of such a measure their wells were all closed. Surely such an act, not wholly inconceivable because in large sections of the state this very thing has occurred in the past, would utterly disrupt interstate commerce, because it would rob that vehicle of all of its business so far as Texas is concerned.

Constitutional Question

"But, gentlemen, I call your attention to the fact that not a single person here has actually spoken in behalf of protecting interstate commerce from any present or impending danger of disruption. No one has appeared before you stating that he is a witness to urge the protection and the adoption of measures seeking to protect interstate commerce, except these gentlemen who tell you in the same breath that they have no concern about interstate commerce but want you to join with them in seeking to trick congress into the passage of a bill under the guise of protecting interstate commerce but for the express purpose of aiding and abetting a monopoly in the oil buisness.

"I say to you gentlemen that I have never experienced such a bold proposal for deceit and fraud to be practiced upon the congress and upon the courts of this country, and you must know, as I do, that any court would tear aside the veil of subterfuge and deceit and seek to know the purpose of the act and ascertain the truth and strike down the measure as wholly unconstitutional.

"No one knows this better than Judge Beaty, who with the same air of certainty and finality took the position a short while back that the National Industrial Recovery Act and orders issued by the Secretary of Interior based thereon, seeking correctly to restrict the production of crude petroleum so as to balance supply and demand, was constitutional. I say to you that Judge Beaty knows in his heart that the proposal contained in his statement is a discredit to him and those who advocate such cunning an indirection. I would be willing personally to wager everything that I possess that if you gentlemen had the power and in its exercise should select Judge Beaty as the sole judge and could divest him of the influences and circumstances today surrounding him, that upon a presentation to him of this measure if it were enacted into law, he would strike it down as unconstitutional.

"When he says, 'To some the difference between regulating production and regulating commerce in the thing produced may seem shadowy, but it is not so from the constitutional standpoint . . . this distinction is indeed important and it must be stressed; it cannot be repeated too often,' he is announcing a new and strange doctrine.

"Again he says, 'If Congress drives straight at an objective within its sphere incidental or secondary effects may be what they will. To restrict products as a means of improving commerce is laying too deep a hole when the power extends only to the regulation of commerce, and the real object in this movement is to improve commerce. If commerce were what it should be, no one would worry about production.'

What Is Commerce?

"Do you think, gentlemen, that he and these who propose this measure are worried about commerce? Haven't they told you over and over that what they are worried about is the oil business and what they really want to accomplish is to restrict production? If under the guise of such loose reasoning as this it were possible to enact such legislation, then by like reasoning every single act that an American citizen performs, the result of which is to produce or create some thing, becomes an act of commerce. The workman who makes a pair of shoes, when he completes those shoes certainly expects them to move in commerce. Therefore, the moment of completion is the moment of the commencement of commerce. The farmer's cow which drops a calf has engaged in commerce; the farmer's sow that bears a litter of pigs has set in process interstate commerce, and as sure as we live every single human act could be regulated and the production of every commodity could be restricted with the same looseness of reasoning that supports the advocacy of this measure.

"No, gentlemen, neither you nor I nor Judge Beaty is deceived. What is sought is to better the price and tighten the monopoly and deliver the whole into the possession of the petroleum barons of this country.

"Now let me turn to another phase of this matter. You have heard from Colonel Thompson that under duress of the same threat of chaos, the black picture of which is presented to you, the Texas Legislature only recently for the twentieth time passed another measure to help out the oil business, making it a criminal offense to violate the valid orders of the Railroad Commission of the state of Texas. We were then told that the passage of such a measure would assure final stabilization, and yet these proponents of this bill are unwilling to wait a scant two months before coming to you with a wilder plea.

"I want to call the attention of this committee to the fact that the federal courts in Texas in a case in which Judge Hutchison, from whom Colonel Thompson quoted, presiding, it was held that the railroad commission of Texas may take as evidence and if they see fit completely follow the findings of the Bureau of Mines with respect to the facts and figures determining the quotas sufficient to supply the market demand of the United States and of the State of Texas. You have now in operation machinery already tested by the courts under which a large degree of order such as these gentlemen desire may be maintained. They now have a remedy perfected so far as human ingenuity is likely ever to perfect it.

Kill State Regulation

"While it is true that there are some 15 to 17 oil producing states, it is also true that Texas, Oklahoma and California possess the great reserves and produce the great bulk of the oil that

goes to market from the wells of the United States. The California potentials are on the decline while Texas and Oklahoma, through efficient state regulatory bodies, are holding their production to substantially the figures indicated by the Bureau of Mines. But I tell you that if this measure should pass, you must know from your experience as men versed in government that there is no such thing as a dual exercise of power by two sovereignties.

"Without questioning Mr. Ickes' desire for aid from the state bodies, and without questioning their good faith, in an effort to be of service I say to you that the state bodies would soon cease to function because they would be powerless. This was the experience we had in Prohibition, and when the time came, as it surely would, that the courts struck down this measure as unconstitutional, you might with a fair degree of certainty then look forward to such a picture of chaos as the proponents of this measure have painted to you.

"In passing, allow me to say this: I have had many bitter controversies with the railroad commission of Texas. Many of their policies and many of their acts have not met with the approval of many of us, but I want now to testify that in my humble judgment no human agency can more successfully cope with the problems confronting them in Texas today than can this commission.

"You can think of numberless reasons why a measure of such far reaching magnitude as this should have great and ample deliberation. I point to only one other. Had it occurred to you that if the act of producing oil in excess of some quota fixed by the Secretary of the Interior may constitute an act interfering with commerce, that by the same token the power of state governments to levy severance or gross production taxes might be seriously called in question? It is entirely possible that some of the proponents of this measure may have had some such happy thought, for it would certainly for the time being relieve them from a great burden of taxation if they could thereby strike down the power of the several states to levy and collect such taxes. I have not investigated the question; neither have you. I am unable to give you the answer, nor do you know it, but you certainly should before proceeding further with such a measure.

"Now in conclusion, gentlemen, let me give you the great fear that besets me in this matter. These gentlemen who propose the bill have painted a picture of chaos in the oil business. Well, I will tell you the great fear that besets me. In a moral matter such as prohibition, which involved only personal conduct, there was but one course to pursue when the plan failed to work, and that was to abandon it, but I foresee that should this measure pass and the inconceivable thing happen of its being held constitutional, that it must nevertheless certainly fail because the incentives for violation are becoming increasingly great, and I ask you in the hours of its failure what the next course will be. And therein lies my fear. There will then arise the proposal that the oil business be nationalized and arguments much more forceful in their picture of destruction will press this congress to launch into the untried seas of government ownership of business.

"I feel that this measure is being driven as a spearhead of destruction into the vitals of our government and in its path, if successfully enacted, may follow chaos indeed."

Value of Institute Work Reviewed; Directors Silent on Control Bill

(Continued from page 9)

years. While the industry recognizes and approves the principle that labor be permitted to negotiate with management in regard to wage and working conditions through representatives of its own choosing, he said he saw in the determination of labor unions to attain a closed shop an attempt to deprive labor of a fundamental right essential to its own welfare and to deprive management of the privilege of direct contact with employes. He held the closed shop is a step backward, inimical to the progress made throughout the years in better understanding between employer and employee, destructive to the liberties of the latter, and of efficient plant management by those acquainted with and responsible for operation of the business.

Markham Attacks Taxes

Excessive taxation of the petroleum industry was attacked also by Baird H. Markham, of New York, director of the American Petroleum Industries Committee, the institutes taxation and legislation group. Markham pointed out that government has become a big business in itself, and requires business brains to assure proper and efficient functioning. Many of the unfortunate results of excessive taxation and inimical legislation, he declared, can be traced to the lack of understanding on the part of non-business minds in government and can be corrected by more extensive participation and representation in government by business and industry.

"The narrowing relationship between government and industry brought about by the National Recovery Act, the application of sales taxes, and by other influences," Markham said, "virtually necessitates a far more extensive participation and representation in government than industry currently enjoys. Particularly is this true as regards the development of governmental policies affecting industry, the framing of legislation applying to business, and the imposition of taxes bearing directly upon business."

Asserting that government already is taking in taxes about 25 percent of the national income, Markham pointed out that such a situation drastically reduces consumer buying power and curtails markets at least by one fourth. He said that despite the unfortunate effect of taxes upon business, the next Congress and 44 state legislatures soon to meet already have given indication they will seek to solve governmental problems by increasing old taxes, imposing new levies, or both.

Markham declared the tax bill of the petroleum industry now exceeds one billion dollars a year; that the tax collector gets revenue equal to eight percent of the industry's 12 billion dollar capital investment, whether or not the industry earns even the interest; that the highway user, the industry's largest customer, is also the heaviest citizen taxpayer; and that the average tax on the 24 gallons of gasoline extracted from a barrel of crude oil is $1.29, or more than the market price of the oil itself.

Destructive Legislation

He held destructive legislation to be another depressing influence, estimating that during 1933 alone more than 2000 bills inimical to the interests of the petroleum industry were introduced in Congress and in state legislatures. Attempts of various competing interests, and even of government, to disrupt or destroy the petroleum industry's markets were cited as further dangers. Declaring that self-protection should not be the only reason for industry's participation in government, but that all industries, and particularly the petroleum industry, can

be an influence for good government, Markham said:

"Never before has there been such widespread recognition of the close relationship between government welfare, public welfare, and industrial welfare. The public, I firmly believe, now realizes that its best interests parallel those of business and industry.

"The petroleum industry, like other industries, and like the public, has withstood heavy punishment. I regret to say that legislative psychology in the future, however, may be based upon the theory that if a nation successfully weathered the world's greatest depression under such handicaps, it will be in a better position to absorb even more punishment under prosperous conditions.

"The pages of history are replete with the failures of governments which tried to solve their problems by further taxation. There is absolutely nothing in human history or experience to create hope that our modern legislators can achieve success in a new attempt along this line. We can look only for further troubles—troubles in government and troubles in business. Day by day it is becoming more obvious that we cannot tax ourselves back to prosperity."

In a paper on "the institute and its activities," Executive Vice President William R. Boyd, Jr., cited figures and statistics from departments in which services can be measured in dollar values to show that even a few isolated activities of the institute have saved the petroleum industry more than $26,000,000 annually. He estimated at 4500 the number of oil men currently active in institute committee work.

Endorse Bureau Office

At a meeting of the board of directors a resolution endorsing Senate Bill 1665, now before Congress, was adopted. This bill is designed to provide for the establishment of a new U. S. Bureau of Mines office at Salt Lake City, Utah. It was the sentiment of the resolution that this new office should be established and financed without disturbing the plans or personnel of the present Bureau of Mines Experimental Station at Bartlesville, Oklahoma.

The board received and accepted the report of director Baird H. Markham on the first year's work of the American Petroleum Industries Committee.

D. S. Bushnell, Northern Group of Pipe Lines, New York, was elected a member of the board of directors for the pipe line group.

The board discussed the Disney bill, calling for federal oil control, without taking action.

National Oil Scouts Hold Convention at Lake Charles

Lake Charles, La.—The eleventh annual convention of the National Oil Scouts of America closed here May 22, following an interesting two-day meeting. Delegates and visitors from all parts of the country attended the sessions, which were held at the Charleston Hotel.

Tom H. Terry, president of the organization, officially opened the convention May 21, and Mayor Josh Trotti of Lake Charles welcomed the scouts to the city with a short address.

The discussion on "Modern Methods of Geophysical Exploration" was a feature of the first day's session. Dr. E. E. Rosaire told of the history and development of the seismograph in the first phase of the discussion, while Dr. Olai Sundt discussed the torsion balance. Increased use of geophysical methods along the Gulf Coast was indicated by these discussions.

J. L. Mathieu talked on "The Schulemberger Method of Well Surveying" and brought out several interesting phases of this type of survey.

The morning session closed with a paper by T. R. Deen on "Development of the Louisiana Gulf Coast." This area has recently assumed a new importance through several deep developments.

A golf tournament was held Monday afternoon at the Lake Charles Country Club. This was augmented by swimming and baseball. A barbecue followed these activities. A dance was held Monday evening at the Majestic Hotel.

The session Tuesday morning included a discussion of the year book which was just issued. This book has been a valuable contribution to Gulf Coast oil history.

At the election of officers Tuesday morning, J. E. Beall, Gulf Production Company, Houston, was elected president; J. A. Bonham, Magnolia Petroleum Company, Lake Charles, first vice president; P. G. Booth, Humble Oil & Refining Company, Cisco, Texas, second vice president; Elton Rhine, Empire Oil & Gas Company, Houston, chairman of the executive committee; and C. O. Faulk, Humble Oil & Refining, San Antonio, secretary and treasurer.

The retiring officers were Tom H. Terry, president; C. A. Strahan, first vice president; H. L. Carpenter, second vice president, and Jesse L. Bullard, chairman of the executive committee.

A special feature of the Tuesday afternoon session was a boat trip to the Hackberry field, via the Calcausieu River. Both the scouts and their wives were included in this excursion.

The meeting closed Tuesday night with a dance in the roof garden of the Charleston Hotel.

Vigorous Enforcement Program Will Be Started

Austin, Texas. — Assistant United States Attorney General Charles I. Francis, assigned to oil code enforcement, wired the Texas Petroleum Council during the past week that he expected a vigorous enforcement program would follow the decision handed down at New Orleans.

"The court," Francis wired, "upheld unanimously, all of our contentions that the Recovery Act, the Petroleum Code and the other federal regulations were valid and constitutional.

"I am on my way to Washington for instructions, which in my opinion will be to the effect that immediate and vigorous enforcement of federal regulations and the code will be started.

"I intend to ask for federal indictment of past as well as future offenders who have disregarded the code and federal regulations which were enjoined by Judge Bryant, but which are now declared to be valid in all respects."

"It looks like we are going to get a break at last," declared Lloyd Wheelock, council president.

California Association Approves Disney Bill

Los Angeles.—Directors of the California Oil & Gas Association at a meeting May 22 voted unanimous approval of the Disney bill as introduced in the House of Representatives May 18, with the definite understanding, however, that the two-year limitation clause, added as a supplementary provision, be retained as an integral feature. The membership of this association is representative of the California oil industry and is usually rather conservative.

HIGH SPOTS IN BRIEF

Completions during the week totaled 336 while new wells were 259. While the number of new wells was smaller than in recent weeks the percentage of success was greater, included being 223 new oil wells and only 94 failures. On the other hand initial production, except in East Texas, was low, the latter state accounting for 644,000 barrels of the total of 682,000 barrels initial estimated and East Texas wells accounted for 571,000 barrels of the Texas total.

Gulf Coast

The new Roanoke field in Jefferson Davis Parish, the twenty-ninth to be opened along the Louisiana Gulf Coast, may become a producing area of major importance. Production from the discovery well, completed at 8682 feet, has increased to 50 barrels per hour of 37 gravity oil. This well is the deepest producer in South Louisiana, and its depth compares favorably with deepest producers in other districts.

Development of a small production on the Lake Hermitage prospect, Plaquemines Parish, has been achieved, and this dome may become the thirtieth producing field along the Louisiana Gulf Coast. The first well produced only a few barrels of oil, but such an output is significant.

California

Mountain View is fast becoming a more important field than first development indicated. Major companies were slow to recognize the possibilities of the field, but the area shows promise of becoming one of major importance in Kern County. Located in the bed of the valley, the structure was a semi-geophysical discovery. It was indicated by both seismograph and torsion balance.

Los Angeles basin fields remain quiet, with the deep producing zone at Montebello looking doubtful. Long Beach is by far the most active field in the area, despite its age and intensive development of the past 12 years.

North Louisiana-Arkansas

North Louisiana operations were quiet extremely so as regards new production, as out of nine completions there was only one oil well and it making only 75 barrels initial. Converse, the only active spot, reported no new starts for the week. As regards production, the conservation department has announced that all increase under the new allowable will go to South Louisiana as there are no prorated wells in the north end. Several projects involving large wildcat blocks are in prospect. Arkansas interest still centered in the supposed Woodbine show in the southwest corner.

South Texas

Four locations have been made around the discovery well in the Sinton field. Plymouth Oil Company, owner of the discovery well, has two of these.

Lease holders in the Vanderbilt field, Jackson County, had a hearing before the Texas Railroad Commission May 25 to work out a development program. Town lots and a railroad right-of-way have complicated drilling requirements.

The North Pettus field is back in the limelight with an extension as well as a lower producing sand.

Michigan and Eastern

New work in Michigan took a spurt upward during the week when 17 new wells were announced. This made a big gain in operations as only five wells were completed, a small gas well which was an extension being the most important. A survey of gas resources in Michigan has been undertaken by the state, while controversy over transmission lines is still in evidence.

The Eastern area had another quiet week, most completions being in Ohio.

Oklahoma Operators Announce 32 New Starts

Tulsa.—New work in Oklahoma maintained an even keel during the week as scouts reported 32 starts in 15 counties. Eastern counties led the state with 14 firsts, southern counties were second with nine firsts, and the Seminole district third with eight firsts. Reports by counties were as follows: Carter, two; Jefferson, one; Marshall, one; Stephens, five; Hughes, one; Pontotoc, three; Pottawatomie, two; Seminole, two; Noble, one; Okmulgee, four; Tulsa, two; Wagoner, one; Creek, three; Osage, three; and Pawnee, one.

In the southern portion of the Lucien pool of southwestern Noble County, Twin State Oil Company announced location for Pfeiffer 1, NW NW SW Section 33-20n-2w. This is one of the few tests which will be drilled on the 10-acre plan in this pool since approval of the development program was obtained on the basis of one well to each 40 acres.

Two locations were announced for the new South Burbank pool of Osage County. Carter Oil Company staked Osage 1, SE SE NE Section 9-25n-6e, and Phillips Petroleum Company was digging pits for Osage 7, NW NW NW Section 15-25n-6e.

Oklahoma City Given Increase In Proposed Allocations

Oklahoma City.—Oklahoma operators recommended allocation of 511,700 barrels daily to state pools in a hearing before the Oklahoma Corporation Commission held on Friday, May 25, to determine distribution of market demand for June. The Wilcox sand zone of the Oklahoma City pool was given the largest increase when the recommended allowable was raised from 125,889 to 140,191 barrels, an increase of 14,302 barrels of the total increase of 35,300 barrels granted the state by the oil administrator. Recommended allowable for unprorated areas was increased from 178,038 to 185,000 barrels, an increase of 6962 barrels. The figures shown below will be incorporated, probably with slight revisions, in the forthcoming order:

POOLS	Daily Allowable May, 1934	Recommended Allowable, June	Change
CLASS A:			
Oklahoma City Wilcox	125,889	140,191	14,302
CLASS B:			
Oklahoma City Simpson	46,835	46,835	None
Oklahoma City Fault Line	1,588	1,719	131
Seminole et al	66,418	71,917	5,499
Maud	1,253	1,100	—131
St. Louis	18,260	20,678	2,418
West Archer	1,648	1,648	None
Konawa	2,094	2,094	None
Sasakwa	893	893	None
Allen	8,291	8,291	None
Sasakwa Townsite	1,207	1,700	493
East Earlsboro (Calvin)	1,600	1,600	None
Fish	2,500	2,500	None
Tatums	7,344	7,952	608
	159,941	168,927	8,986
CLASS C:			
Crescent	3,500	5,000	1,500
Lucien	7,000	10,000	3,000
Keokuk	960	1,500	540
Fish (Simpson Sand)	322	322	None
	11,782	16,822	5,040
CLASS D:			
Lincreek (County Line)	550	550	None
Orlando	150	150	None
Lucien (Hunton)	50	50	None
	750	750	
UNPRORATED:	178,038	185,000	6,962
State total	476,400	511,700	35,300

New Oklahoma Wells Have Small Initial Output

Tulsa.—Development in Oklahoma resulted during the week in 22 oil wells which yielded at the initial rate of only 7151 barrels, making it one of the poorest weeks in many months from a new production standpoint. Included in the completion reports were two dry gas wells with total initial volume of 23,000,000 cubic feet, three abandoned locations and nine dry holes, a total of 36 completions in 16 counties.

Seminole County led the state in new production with 4284 barrels from four wells, one of which is a south offset to the discovery well in the Sasakwa Townsite pool.

Reports were as follows:

Company, Well and Location	Init. Prod. Bbls.	Depth
CARTER COUNTY—		
Trowbridge et al, Ratliff 1, se nw sw 19-1s-2w	10	2120
Walter H. Gant, Burton 3, ne nw se 31-1s-2w	142	2221
Daphfine Oil Co., Major 6, sw se se 25-1s-3w	310	2646
CREEK COUNTY—		
Bailey Oil Co., Jarjo 1, ne nw ne 12-16n-9e	*	3606
Bay State Oil, Tiger 1, se sw sw 3-17n-8e	125	1385
Doke & Hughes, Jones 2, nw ne nw 10-17n-8e	35	1343
L. B. Jackson, Williams 3, cel nw se 27-18n-8e	75	1332
W. B. Pine, Richards 3, nw ne se 27-18n-8e	*	1335
BECKHAM COUNTY—		
West Oak Gas Co., H. N. Eason 1, nwc sw 11-9n-25w	¶18	3550
GRADY COUNTY—		
J. B. Nickolos, Farwell 5, cwl ne se 26-5n-8e	¶2	1955
HUGHES COUNTY—		
Bur-Kan, Gardner 1, nec nw 22-6n-9e	*	3855
Manahan, Chapman 5, nw sw se 10-7n-8e	100	2967
S. D. Wells, Amery 1-A, swc nw 28-7n-8e	8	1210
LINCOLN COUNTY—		
Stanolind O&G et al, Rice 6, ne nw ne 11-14n-3e	1324	5010
Anderson & Kerr et al, Huckaby 1, swc sw 9-15n-2e	*	5375
OKFUSKEE COUNTY—		
H. Stekoll, Holmes 30, nw ne se 16-11n-11e	12	2680
OKLAHOMA COUNTY—		
Harper-Turner, Hayes 2, se ne nw 22-11n-3w	†	....
Russell Petroleum, Russell Comm. 3, ne se nw 22-11n-3w	†	....
OKMULGEE COUNTY—		
Gled Oil Co., Doyle 1-A, swc nw 28-13n-14e	*	2568
OSAGE COUNTY—		
Lewis & Continental, 1-A, nec nw 16-24n-7e	*	961
Schonfield et al, 1-A, se ne nw 22-24n-8e	15	2367
Carter et al, Oliphant 3, cw½ w½ se 10-25n-6e	¶5	2797
PAYNE COUNTY—		
Deep Rock Oil, Harris 1, sec nw 9-18n-5e (owdd)	40	3618

Company, Well and Location	Init. Prod. Bbls.	Depth
PONTOTOC COUNTY—		
Morris-Wilson & Jones, Dyar 1-B, sw sw sw ne	*	1071
Huckleberry, Miller 2, nw se nw 27-5n-6e	300	3167
H & M Drilling Co., Busby 3-A, cel sw se 20-5n-8e	10	875
POTTAWATOMIE COUNTY—		
Elbar, Wyatt 2, sw nw nw 10-7n-4e.	345	3735
Witt et al, Fundis 1, ne nw ne 33-8n-3e	†	....
SEMINOLE COUNTY—		
Oklahoma Oil Co., Cravins 1-A, sec sw 24-5n-5e	1250	2617
Stanolind O&G Co. and Amerada Pet. Co., Palmer 2, se nw nw 36-6n-7e	2740	4059
Indian Territory Illuminating Oil Co., Goodin 2, se ne ne 23-9n-6e (owpb)	264	4126
Merva Oil Co., Johnston 1-B, sw nw ne 10-10n-8e	30	1645
STEPHENS COUNTY—		
Mudge Oil Co., F. M. Wood 31, ne nw nw 26-1s-5w	4	395
Lewis Sikes, Furst 5, sw se nw 16-1s-8w	*	2544
Raizen Brothers, Brown 5, ne nw se 2-2s-5w (owdd)	10	682
Owl Oil Co., Billey 21-A, cw½ ne 9-3e-5w	2	448
TULSA COUNTY—		
Kerr & Bissett, Sanger 2, nw se se 9-19n-10e	*	890

*Failures; †Junked; ¶Million cu. ft. gas.

Kansas Short Completion List Adds Little Oil

Wichita, Kansas.—Harvey, McPherson and Reno Counties accounted for all but 49 barrels of new production added in Kansas during the week when six oil wells had a total initial production of only 2886 barrels. The report, which is shown below, included two abandoned locations and six dry holes, a total of 14 completions.

Total footage was 30,495 feet, of which 80 feet were in two old wells drilled deeper.

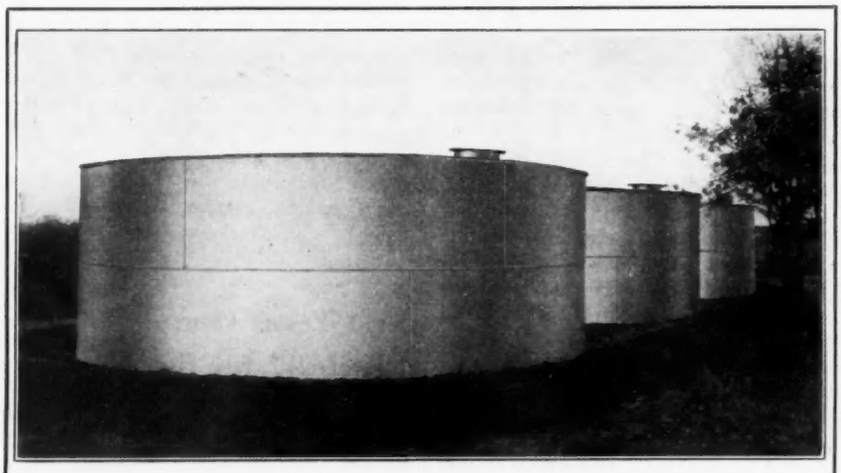
Company, Well and Location	Init. Prod. Bbls.	Depth
BUTLER COUNTY—		
Bradley, Bush 1, cnw nw 21-29s-4e.	†	....
GREENWOOD COUNTY—		
McGriner, Wiggins 12-B, se sw ne 30-24s-11e	*	2031
Greenwood Oil, Smith 1, se sw ne 15-25s-11e	*	1676
HARVEY COUNTY—		
Derby Oil Co., Schmidt 1, se sw nw 17-22s-3w (owdd)	1128	3485
Hollow, Schmidt 3, sw ne nw 17-22s-3w (owdd)	480	3482
McPHERSON COUNTY—		
Carey, Holt 4, ne sw se 13-19s-2w..	178	3438
Helmerich & Payne, N. W. Russell 7-B, se ne ne 23-19s-2w	†	....
Vernon Oil, Drum 5, sw nw ne 35-19s-2w	46	2950
Slick et al, Ordineal 1, se sw se 21-20s-3w	*	3772
PHILLIPS COUNTY—		
Ashby et al, Close 1, cse 24-5s-18w.	*	3455
RENO COUNTY—		
Sinclair Prairie Oil Co., Bose 3, cse se 26-23s-4w	1005	3367
RICE COUNTY—		
Ramsey Oil Co., Smith 3, Lot 9, Block 13, sw 31-19s-9w	*	3251
RUSSELL COUNTY—		
Stanolind O&G Co., Austin 16, se nw sw 30-12s-15w	49	3089
Western Petroleum, Burr 1, swc sw 30-15s-12w	*	3390

*Failures; †Junked; ¶Million cu. ft. gas.

Indian Land Lease Sale Again Gets Slight Notice

Muskogee, Oklahoma.—Boycott of restricted Indian leases under the new lease form was further shown on Thursday, May 24, when only 23 of the 42 tracts offered for oil and gas lease were sold at public auction here. The 23 tracts, comprising 1,815.06 acres, brought a total bonus of $3,726.26, an average of $2.053. This is the fourth sale under the new lease form which was promulgated by the department of interior October 10, 1933. None have been satisfactory from the viewpoint of members of the Five Civilized Tribes. Efforts are being made to obtain some modification of provisions which oil men term drastic.

Chandler, Oklahoma.—The Chandler pool of Lincoln County was given a half-mile southward extension during the week when Sloan & Cooper's Jordan 1, NE SW NE Section 18-14n-4e, encountered Simpson dolomite at 4952 feet and drilled to 4980 feet, where it was estimated good for 80 barrels per hour.



WELDED TANKS

for Lease Storage cost no more, yet they are LIQUID and GAS TIGHT . . . and they Offer Equal Salvage . . .

The Wyatt Metal & Boiler Works now have field crews equipped to build and erect welded steel tanks for lease storage. These crews are specializing on 200 to 1,000-barrel tanks but are prepared to furnish any desired size for field use.

The welded steel tanks cost no more than bolted tanks yet are liquid and gas tight. The seams are as strong as the parent plates. This retards deterioration.

The salvage value of welded tanks is equal to that of bolted tanks. The seams can be cut away and welded again without loss of efficiency or affecting the dimensions of the tank.

Consult us the next time you have lease tanks to erect. We can give quick service.

We also offer welded gun barrels

WYATT
METAL AND BOILER WORKS

Capital $1,000,000

Plants at . . . DALLAS and HOUSTON

Distributors: **Steel Tank Construction Co., Dallas, Texas**

Shawnee, Oklahoma.—Amerada Petroleum Corporation and Stanolind Oil & Gas Company staked location for Goodman 1, SW SW NE Section 5-10n-4e, one-half mile northeast of the city limits of Shawnee. The two companies have a large block which almost entirely surrounds the city and which covers a structure which shows favorably both by geological and geophysical survey. It will be carried to Wilcox sand in the event that commercial production is not found above that horizon.

Trinity Sand to Be Tested In Corsicana-Powell Area

Corsicana, Texas.—The Trinity sand, only probable oil or gas producing horizon to be found below the Woodbine sand, is to be explored for the first time in the Corsicana-Powell field by a test soon to be started by R. L. Wheelock, J. L. Collins and associates, who have been engaged for several months in assembling a lease block along the west flank of the producing area. Magnolia Petroleum Company and Humble Oil & Refining Company are reported to have acquired one-third interest each in the proposed deep test.

Production in the Trinity sand was partially proven in the Mexia field exactly seven years ago when the E. L. Smith Oil Company et al's Jake Steubenrauch 1 blew in at 5738 feet making 5,000,000 cubic feet of gas with a spray of distillate. The hole was junked in trying to land the long string of 6⅝-inch pipe without ascertaining the value of the strike. Some two years later C. F. Lytle et al's Thompson 4 drilled to 6061 feet, and junked the hole in trying to plug back and make a test of gas sand passed up after fulfilling contracted depth.

Illegal East Texas Oil Increases During Week

Tyler, Texas.—The supply of illegally produced crude originating in the East Texas field showed a big increase for the week ending May 21. Accounted-for excess production was estimated at about 70,000 barrels daily, while it is believed that the actual volume was well above this figure as violators have been endeavoring to make the most of their profitable operations for fear that same might be sharply curbed by legislation now pending at Washington.

A decline in the supply of hot oil is anticipated for the week ending May 28 because of the unexpected stand taken by the United States Fifth Circuit Court of Appeals on May 22 in setting aside a three-judge court decision that virtually stripped the oil code administration's proration enforcement staff of police powers in the East Texas field. Chronic violators have been growing bolder in defying state authorities, district court restraining orders and avoiding immediate payment of nominal fines assessed by state courts by appealing convictions. Restoration of the federal authorities to active duty in the field will automatically influence many producers and refiners engaged in hot oil traffic to the extent of tapering off their operations until it becomes definitely known what punishment will be meted out to those caught violating.

Allowable production of the field for the week was 475,550 barrels daily from 13,205 flowing and pumping wells. During this period the trunk lines transported 491,900 barrels daily from the field, an increase of 27,250 barrels daily over the previous week. Refineries within and near the field also stepped up their accounted-for crude runs by 8100 barrels daily, having averaged 55,630 barrels daily.

East Texas Completions Reach 87 for the Week

Tyler, Texas.—Completions in the East Texas field for the last week were 87. Of these 82 were producing wells with total initial output of 571,635 barrels. Two gas wells and three dry holes accounted for the remaining completions.

Detailed list of completions in the East Texas field for the past week follows:

Company, Well and Location	Init. Prod. Bbls.	Depth
JOINER AREA—		
Amazon Pet. Corp. (Ambert-Reed), Si Lacy 1 (103-ac)	*	3700
B. G. Byers et al, Irion 1	3500	3766
A. P. Carey et al, Ras Redwine 4 (20-ac)	400	3652
R. H. Dearing & Son, Eula McDavid 2 (78.6-ac)	650	3745
Deep Rock Oil Corp. et al, W. W. Holland 5 (40-ac)	3500	3730
W. W. Holland 6 (40-ac)	7500	3720
Gulf Prod. Co., S. B. Stone 10 (107.58-ac)	7400	3806
Humble, Chas. Pilgreen 13 (136.4-ac)	6500	3717
W. L. Price 41 (432-ac)	9000	3764
R. E. L. Silvey 39-A (240-ac)	9500	3736
Heywood White 10-B (132.96-ac)	5000	3769
Hunt Prod. Co., H. C. Maxwell 15-A (108.52-ac)	10,500	3768
R. J. Vinson 7-A (59.47-ac)	550	3737
K. O. T. Oil Co., S. S. Cook 5 (46.66-ac)	5500	3777
Louisiana Oil Ref. Corp., H. Kersh 5 (79.65-ac)	7200	3605
C. H. Lyons-Neeley et al, S. S. Cook 1	9000	3754
John Mabee Consolidated Corp., J. F. Maxwell 1-B (41-ac)	475	3650
Maco Oil Co., Mayfield-Alford 3	4500	3672
Magnolia, Roy Loosier 13 (137.7-ac)	9700	3673
McCulloch Oil Co. & E. H. Moore, Smith-Church 4 (12¾-ac)	9000	3785
M. H. Murrey, Tr., G. A. Turner 6 (112-ac)	9400	3797
Ortiz Oil Co., Afton Thrash 6, (16⅓-ac)	500	3719
Spandsco Oil & Roy. Co., W. P. Brett 8 (47.78-ac)	7400	3714
Sun Oil Co., J. D. Henson 16 (216⅔-ac)	4500	3659
Tide Water Oil Co., J. W. Flanagan 7 (40-ac)	8000	3686
Ward Oil Corp., J. M. Finney 10 (26.61-ac)	2000	3703
KILGORE AREA—		
Ben G. Barnett et al, I&GN Ry. Fee 1	7000	3732
Blue Star Oil Co., Sabine River 3-K	9000	3551
Robt. Booth et al, Willis Smith 1 (67/100-ac)	10,000	3599
Byrd-Frost, Inc., J. B. Watson 3-A (22-ac)	12,000	3625
Champlin-Bass, Inc., J.B. Watson 7 (23.49-ac)	9600	3610
DeArman Bros. & L. O. McMillan, Alex Strong 4 (26-ac)	7500	3674
Alex Strong 8 (26-ac)	7500	3680
Delta Drlg. Co., L. D. Crim 3 (20-ac)	960	3557
Empire Gas & Fuel Co., A. A. Lockhart 4 (40-ac)	8000	3680
M. T. Flanagan et al, M. Kennedy 4 (20-ac)	4000	3735
General Crude Oil Co., S. Scott 9 (37½-ac)	9000	3590
Gulf Prod. Co., H. C. Alexander 21 (2909-ac)	7200	3540
A. Laird 10 (54.31-ac)	7800	3611
R. H. Still 13 (188.38-ac)	4000	3630
J. D. Hall & M. C. Snowden, Solon King 2 (1-ac)	1000	3553
Hawkeye Pet. Co., W. Smith 3-B	5500	3590
Lewis Prod. Co., C. B. Pegues 8 (40-ac)	10,500	3664
Magnolia, John Radford 20 (252-ac)	7600	3662
John Radford 21 (252-ac)	10,000	3627
Sabine Synd., Geo. Thompson 6 (20-ac)	9000	3656
Shell Pet. Corp., M. H. Bivins 7-B (118.2-ac)	8000	3665
J. B. Watson 37 (285.2-ac)	9400	3655
T. Wells 3-A	8500	3730
Snowden et al, Hirsch-Kollman 1	7000	3573
Sun Oil Co., C. H. Hilburn-Loyd 15 (133.7-ac)	9100	3710
Tide Water, W. D. Lacy 8 (80-ac)	6500	3570
J. B. Wason 5 (23.85-ac)	7000	3596
C. J. Webster O&G Co., M. Register 1 (20-ac)	5500	3684
Woodley Pet. Co., Geo. Thompson 3 (10-ac)	10,000	3674
Joe Zeppa, Tr. (Delta Drlg. Co.), M. Charles-Webster 3 (8-ac)	6500	3652
LONGVIEW AREA—		
W. D. Ambrose et al, Geo. Jones 7 (40-ac)	10,000	3602
Amerada Pet. Corp., E. Burnside 10 (100-ac)	8000	3541
Arkansas Fuel Oil Co., J. C. McKinley 3-D (23.23-ac)	6500	3597
Clark-Cowden Drlg. Co., H. Clements-Delaney 4 (22-ac)	7600	3668
Empire Gas & Fuel Co., Joe Bander 10 (93.3-ac)	10,500	3635
J. C. Bumpas 11 (57.85-ac)	7200	3566
Taylor Lee 20 (187.18-ac)	11,000	3562
Fain-McGaha Oil Corp., E. W. Clements 6 (50-ac)	9800	3619
Faith Oil Corp., B. B. Fenton 7 (52.4-ac)	9100	3756
Gulf Prod. Co., A. N. Neeley 6 (49.44-ac)	8500	3534
Humble, H. Castleberry 7 (244½-ac)	6500	3512
W. W. Holland 20 (201-ac)	7500	3620
W. C. Mackey 12 (198½-ac)	3000	3600
T. D. Humphrey et a, J. H. Thomas 1 (50-ac)	3500	3618
Ray & Foster, Jones et al, J. R. Smith-Humble 1 (50-ac)	*	3681
Lucey Pet. Co., McHaney-Loeb 5 (39.82-ac)	9600	3580
Magnolia, Howard Hampton 10 (160-ac)	7200	3686

Company, Well and Location	Init. Prod. Bbls.	Depth
B. F. Phillips (was Sorrels-Owens), J. W. Free-Humble 2 (50-ac)	1000	3683
Rancho Oil Co., J. K. Edwards 10 (106-ac)	4000	3680
Sinclair Prairie, M. Lawson 13 (84.19-ac)	11,000	3544
Sklar Oil Corp., J. H. Anderson 3	200	3620
E. L. Smith Oil Co., E. A. Watts 2 (100-ac)	5500	3666
J. R. Smith Properties, J. B. Doby 5 (20-ac)	12,000	3518
Stanolind-Simms Oil Co., M. Lemaire 4 (38¾-ac)	10,000	3674
M. Lemaire 5 (38¾-ac)	9600	3669
Sun Oil Co., J. C. Gray 10 (64-ac)	5000	3639
W. F. Turner et al, Alford Jones 9 (63.84-ac)	12,000	3660
Miscellaneous Completions		
VAN FIELD—		
Shell Pet. Corp., E. L. Fowler 12 (35.35-ac)	10,000	2955
Wildcat Completions		
FREESTONE COUNTY—		
J. B. Daniel Oil & Roy. Co., Phil Ball 1	¶5	5003
LEON COUNTY—		
Shell Pet. Corp. et al, G. W. Lee 1	¶25	6040
UPSHUR COUNTY—		
F. A. Fuller et al, D. W. Penn-Shell 1	*	3754

*Failures; †Junked; ¶Million cu. ft. gas.

Archer County Still Best Bet in North Texas

Wichita Falls, Texas.—An aggregate of 5499 barrels of new production was added to North Texas during the past week through the completion of 27 shallow oil producers. There were also 15 failures drilled during this period, making a total of 42 completions.

The Falls County School Land area in Southern Archer County clings to its leadership in contributing a high percentage of the big oil producers, resulting from acid treatment of the lime horizon. Perkins-Cullum Oil Company's Falls 8-A, Block 19, gauged 100 barrels oil per hour on two-hour open flow test on the second day after completion, using 1500 gallons of acid solution in the lime at 1073-1082 feet. L. F. Hooker et al's Wm. Justice 2, Block 4, Wm. Patton Survey A-345, earned a potential rating of 400 barrels daily after finishing with three-inch casing and treating saturated lime at 1085½-1099½ feet with 1500 gallons of chemicals. A string of 5 3/16-inch casing parted, necessitating the use of the small size pipe as an emergency measure.

Search for additional Canyon lime horizon oil areas on the strength of the success of Deep Oil Development Company et al in the Chalk Hill area, is still underway in Archer County, but not on a large scale. Huggins Oil Company's J. R. Parkey 1-C, NWc Section 1, S. P. Ry. Survey A-423, was deepened from 1745 feet to the Canyon horizon at 2550 feet, but issued plugging orders after finding the zone barren of production.

A failure for the Horal-James field, Young County, was recorded when Pitzer & West, Inc.'s Haggard-James 1-C, NWc Section 457, T.E.&L. Co. Survey, proved dry after a second treatment with acid at a total depth of 3947 feet. This dry hole is an east offset to the same concern's big producer on the Morrison tract. Continental Oil Company's S. D. Walker 1, SEc Section 427, was coring lime at 3935 feet, and also appeared doubtful of making a well, although it is a direct offset to the big well. Walker 1 topped the lime at 3800 feet.

Detailed list of completions in North Texas for the past week follows:

Company, Well and Location	Init. Prod. Bbls.	Depth
ARCHER COUNTY—		
O. T. Anderson et al, Wm. Justice 5	15	877
Bonner Oil Co., Abercrombie 7-E, Blk. 154	20	1148
Bridwell Oil Co., Falls County 5-E.	175	1105
Burk Royalty Co., W. I. Pace 2	*	1200
L. T. Burns & Long, L. F. Wilson 10-R, Sec. 108	300	1457
Continental & Bridwell Oil Co., Logan 10, Blk. 26	100	1140
Fain-McGaha Oil Corp., L. F. Wilson 1-A, Sec. 86	*	1560
Fain-McGaha-Humble, Logan 29	200	1160
Golding-Cochran, G. A. Lauster 11, Sec. 2	15	1317
W. B. Hamilton et al, Abercrombie 27	40	1170
C. W. Coffield 18	110	1118
L. F. Hooker et al, Wm. Justice 2, Blk. 4	400	1099
Kelly & Everett, Mrs. Ben Hull 1	*	1380
C. B. Long et al, Logan 12	120	1163
Massey & Featherstone, Archer 1	10	967
Geo. L. Pace et al, Abercrombie 6, Blk. 155	25	1147
Perkins-Cullum Oil Co., Falls-Hanzen 21, Blk. 11	200	1142
Falls-Tiktin 16, Blk. 13	175	1120
Falls 8-A, Blk. 19	2000	1082
Falls 7-C, Blk. 6	125	1174
Perot Oil Corp., Wm. Justice 1	375	1102
Petroleum Producers Co., B. C. Andrews 2	*	966
J. T. Richardson 2-D, Blk. 1	*	1276
Pois-Schultz-Weaver, F. C. Green 22	150	1163
Rathke Oil Co., Benson 4-A, Sec. 1808	50	743
Staniforth & Ray, T. B. Wilson 6	225	1600
Steele Drl. Co., Archer County 1, Sec. 1853	*	900
Texas Co., M. E. Pace 1, Blk. 114.	*	1553
Texho Oil Co. (John Hooser), Anderson 2, Blk. 18	500	1429
W. D. Thorn et al, O. Morris 1	*	650
CLAY COUNTY—		
Bridwell Oil Co., Stephenson 2, Blk. 55	*	254
Metzner & Gerard, Thornberry 5	4	361
JACK COUNTY—		
Texas Co., L. S. Wright 1	*	855
MONTAGUE COUNTY—		
Bridwell Oil Co., F. H. Begley 3-B.	15	1782
WICHITA COUNTY—		
Golding-Cochran, Waggoner Bros. 1-C	60	1390
Peckham & Medders, W. T. Waggoner 1-C	*	1931
Petroleum Producers Co., Allen-Kemp 34, Blk. 28	*	1501
Geo. Proctor et al, W. B. Honaker 17	60	1364
YOUNG COUNTY—		
B. C. Gilmore et al, W. H. Daley 1.	*	601
L. A. Long et al, C. K. Garvey 1, Sec. 1859	30	727
Pitzer & West, Inc., G. W. James 1-C	*	3947
Wheeler & Brashear, P. C. Coleman 1, Sec. 229	*	1103

*Failures; †Junked; ¶Million cu. ft. gas.

Strawn Townsite Edge Well Makes Gasser

Ranger, Texas.—Completions in West Central Texas last week included a 15,000,000 cubic foot gasser in Texas Pacific Coal & Oil Company's Fee (Bird) 4, located on the edge of the Strawn townsite field, Palo Pinto County, from the Marble Falls lime section at 3005-3057 feet. This gasser was yielding 400 gallons of drip gasoline daily within a few days after its completion.

The district accounted for 13 completions during the week, including seven dry holes. There were five oil producers, all confined to Brown and Shackelford Counties, with an aggregate of 170 barrels of new production.

Petroleum Oil Interests, Inc., et al's J. A. Thompson 1, reported last week as opening a new Fry sand field about seven miles north of Brownwood, Brown County, has been completed for 20 barrels daily from sand at 1325-1329 feet.

Completions in West Central Texas for the past week follow:

Company, Well and Location	Init. Prod. Bbls.	Depth
BROWN COUNTY—		
Petroleum Oil Int., M. M. Cox 1, Sec. 49	15	2405
J. A. Thompson 1	20	1329
CALLAHAN COUNTY—		
Atkinson & Sandefer, I. N. Jackson 2, Sec. 115	*	1210
Ogburn & Holmes, Kelton 1, Sec. 148	*	811
COLEMAN COUNTY—		
Dean & Adkisson, G. S. Stewart 1.	*	1602
PALO PINTO COUNTY—		
Texas Pacific C.&O. Co., Bird 4	¶15	3057
SHACKELFORD COUNTY—		
Engle Bros. et al, Mathews 5, Sec. 32	*	1165
Grisham-Hunter Corp., Ward 4-D, Sec. 3	35	2086
Lillian D. Hill et al, Parker 1	*	696
Roeser-Pendleton, Inc.-Humble, Morris 12, Sec. 201	40	1614
Tannehill Oil Co., Newell 33, Sec. 11	*	970
Joe Warren et al, W. P. Newell 2, Sec. 13	*	1060
Worth Pet. Co., Jeter 3, Sec. 14	60	902

*Failures; †Junked; ¶Million cu. ft. gas.

Crane County Wildcat May Be Abandoned After Shot

San Angelo, Texas.—Failing to show for a commercial producer after drilling to sulphur water at 3715-3720 feet, the Northeastern Crane County wildcat test of Wahlenmaier Petroleum Corporation et al, on the Will P. Edwards ranch, is scheduled to be abandoned without being shot. This wildcat encountered a series of saturated lime horizons showing oil between 3235 feet and 3510 feet that would probably yield a small pumper after shot, but considered unprofitable to operate.

Drilling was resumed late last week

on the Humble Oil & Refining Company's R. M. Means 1, Northeastern Andrews County wildcat, with rotary equipment after recovering tools lost when a flow of 10,800,000 cubic feet of sweet gas was encountered at 2957 feet. The same company's J. W. Kuykendall 1, located in the Deep Rock area, Andrews County, was flowing by heads while drilling in lime at 4390 feet, with first pay at 4244 feet. It will be carried through the saturated lime zone, and then is scheduled to be shot.

C. J. Davidson et al's Cummins-Empire 1, testing a wildcat block in Northwestern Ector County, is nearing a decisive depth in drilling below 4200 feet. A small show of gas was logged at 4164 feet.

Broderick & Calvert, Inc., Ft. Worth, are to proceed with the drilling of a test on their wildcat block in the northwestern Upton County. Location has been made at C SW NE Section 22, Block 42, T&P Ry. Survey, T-4-S, on fee land of the Homer, (La.) National Bank. An oil discovery was made in Ector County by the above concern last year.

Nothing of interest developed from the Ordovician lime tests in West Texas during the past week. Gulf Production Company's J. T. McElroy 103, Upton County, was drilling and coring at intervals in gray lime and chert at 10,230 feet, having topped the first section of Ordovician at 10,167 feet. Humble Oil & Refining Company's White-Baker 1, Pecos County wildcat, was drilling below 9615 feet.

Simms Oil Company's W. D. Johnson 1, promising discovery well of deeper oil horizon on the north end of the Grand Falls district, Ward County, was running 4¾-inch casing to test sand found at 2910-2919 feet, with an elevation of 2583 feet. The drilling contractor was carrying hole full of water when the lower oil zone was encountered, but the test has shown sufficient oil to indicate a probable producer. The oil is reported to be of similar grade as the regular Grand Falls production, carrying little sulphur.

The "New Recovery" Bit

NR BIT

If—

it's skilled Design and machining you're looking for in Bits, study the inside of this one.

This Choice of South Texas Diggers is becoming the Choice wherever used.

. . . . . .

For faster hole at less cost write or wire

State Bit Co.

THE "NEW RECOVERY" BIT

HOUSTON REFUGIO

Wheeler County Gets Most Panhandle Wells

Pampa, Texas.—Wheeler County was the principal source of completions and new production registered by the Texas Panhandle during the past week. There were four oil producers with a combined initial rating of 2354 barrels of oil and a single gasser estimated at 32,000,000 cubic feet daily completed in the district during the seven-day period, and three of the oil wells were on leases in Wheeler County.

Skelly Oil Company's O. L. Derrick 1, SEc S½ Section 53, Block 24, H&GN Ry. Survey, located in a previously outlined prolific area in western Wheeler County, was given a potential rating of 1000 barrels daily after penetrating granite wash pay horizons at 2450-2459 feet and 2492-2495 feet. The volume of gas accompanying the oil is inadequate to flow the well when restricted to its proration quota, and plans are to install pumping equipment, else flow with gas lift. It is a northwest diagonal offset to Alma Oil Company's Johnson-Gulf 1, which was completed last March, rated at 840 barrels daily at 2449 feet.

The other two oil producers credited to Wheeler County were drilled in the west extension of the original Shamrock field. Humble Oil & Refining Company's J. P. Koons 2, second completion for the company in the county, averaged 155 barrels daily on official five-day proration gauge from granite wash at 2329 feet. Magic Oil & Gas Company's W. S. Walker 1, NEc SE Section 44, Block 24, gauged 186 barrels in 17½ hours at 2395 feet, but averaged only 130 barrels on five-day gauge because of paraffin accumulation.

Completions in the Texas Panhandle for the past week follow:

Company, Well and Location	Init. Prod. Bbls.	Depth
GRAY COUNTY—		
Sinclair Prairie, Combs-Worley-Moody 4	970	2968
HUTCHINSON COUNTY—		
F. C. Henderson et al, Sanford-Whittenburg-Conoco 1	¶32	2810
WHEELER COUNTY—		
Humble, J. P. Koons 2	175	2329
Magic O&G Co., W. S. Walker 1	200	2395
Skelly Oil Co., O. L. Derrick 1	1000	2495

*Failures; †Junked; ¶Million cu. ft. gas.

Small Yates Vacancy Tract Yields Good Oil Producer

San Angelo, Texas.—An aggregate of 50,907 barrels of new production was added by the completion of six producers in West Texas during the past week. There were two failures completed on wildcat blocks in Crane County. Gulf Production Company's Edwards 1-D was eliminated by sulphur water at 4989 feet, while in the northeastern corner of the county the Wahlenmaier Petroleum Corporation's Will P. Edwards 1 was abandoned in water horizon at 3720 feet.

The bulk of the new production scored by the district last week was through the completion of M. D. Bryant et al's Bob Reid 1, located on 1.985-acre vacancy lease in the prolific section of the Yates field, flowing 2018 barrels oil per hour from saturated lime at 1220-1390 feet.

Completions in West Texas during the past week follow:

Company, Well and Location	Init. Prod. Bbls.	Depth
CRANE COUNTY—		
Gulf. Prod. Co., Chas. Edwards 1-D	*	4989
Wahlenmair Pet. Corp. et al, Will P. Edwards 1	*	3720
HOWARD COUNTY—		
Shell Pet. Corp., Kloh 4-A	1050	2342
PECOS COUNTY—YATES FIELD—		
M. D. Bryant et al, Fred Turner 1 (1.985-ac)	48,430	1390
Stanolind O&G Co., J. H. Tippett 11-A	2	425
WARD COUNTY—		
Gulf Prod. Co., O'Brien 44	690	2759
Tex-Mex Pet. Corp., Owens-Llano 2	540	3067
WINKLER COUNTY—		
Sid Richardson et al, W. F. Scarborough 2-B	195	3056

*Failures; †Junked; ¶Million cu. ft. gas.

Wildcat Failures Ahead in South Texas Completions

San Antonio, Texas.—Several important wildcats were included in the abandonments during the week in South Texas. There were a number of producers in spotted sections of the district.

The completions follow:

Company, Well and Location	Init. Prod. Bbls.	Depth
BEXAR COUNTY—		
N. S. Powell, N. Sanner 1, Ruiz sur No. 47, 5280 ft nl & 400 ft el, 128 ac tr	*	1001
A. J. Trawalter's Fee 2, 150 ft n & w 1 83-ac tr, S. Jett sur	*	1619
Van Duyn & Volz, J. F. Slather 1, 285 ft wl & 2300 ft nl 361 ac tr, A. A. Gardiner sur	*	800
DUVAL COUNTY—		
Birdwell Oil Co., C. W. Hahl 3, blk 29, sec 25	240	2334
Cox & Hamon, State 12, sw nw sw sec 60	240	2257
Humble, Paul White 23, sec 249	720	2243
Magnolia, J. W. Riley 5, sw ne sw sec 45	120	2262
Duval Ranch 26, sec 208	75	2338
Reed & McKay, State 4, ne se sw sec 60	840	2271
State 8, nw sw nw sec 60	960	2234
Sun, Weiderkehr 60, sec 359	600	2311
Texas, Duval Ranch 9-A, sec 206	*	1501
Windsor Oil Co., W. R. Peters 2-B, sec 33	¶25	2571
GOLIAD COUNTY—		
Jane Oil Co., E. L. B. Smith 1, 330 ft nw & swl 142.9-ac tr, B & B sur 23 and 25	245	3662
GUADALUPE COUNTY—		
J. E. Clark et al, Howell 1, Jacob Darst sur, 1950 ft nl & 200 ft wl tr	*	2890
JACKSON COUNTY—		
J. T. O'Neil et al, J. R. Davis (LaWard Farms) 1, I. & G. N. sur 18, 660 ft n & wl blk 93	*	6804
Ed Parsons et al, Clark 1, R. J. & M. Clark lease, A. S. White sur, 300 ft s & w 1 tr	*	5377
JIM WELLS COUNTY—		
C. H. Robertson, C. Muil 1, 150 ft sl & 3427 ft el 700-ac ls, Poitevent sur No. 205	*	3512
McMULLEN COUNTY—		
Al Buchanan, E. R. Hagist 1, 990 ft wl & 330 ft sl, n ne sec 18, M. B. de Spain sur	*	2267
R. E. Cotulla et al, Mary A. Gordon 1, 330 ft n & w 1 sw sec 127, A. B. & M. sur	*	2509
Loma Oil Co., L. Jacob 101, Benham sur	65	915
C. C. Shumway, Inc., Shiner Ranch 5, 330 ft n & w 1 ne sec 66, Shumway sub	*	2466
REFUGIO COUNTY—		
Texas, J. F. Welder 1, 466 ft n & 2700 ft e nw cor Trinity Dr & Continental lease, J. T. McGrew sur	*	6014
TRAVIS COUNTY—		
McNeil Pet. Co., P. C. Wells 1, 150 ft s & w 1, 52-ac tr, Harrell sur	*	916
Humble, C. J. Poth, 500 ft nel, 150 ft nwl 105.5-ac tr, G. Gates sur, core test	*	....
VICTORIA COUNTY—		
Texas, A. M. McFadden 8, 6600 ft nl & 1383 ft el A. J. Gray sur	*	6459
WILLIAMSON COUNTY—		
J. C. Abbott, Fee 1, S. Miller sur	35	1590

*Failures; †Junked; ¶Million cu. ft. gas.

Livingston Developments Help to Define Field

Houston.—In the Livingston field, Polk County, H. B. Owenby's Kinaes 1, A. Viesca Survey, was completed late last week for 203 barrels of oil in 12 hours through a quarter-inch choke, with tubing pressure of 525 pounds and casing pressure of 750 pounds. The well was producing from sands found at 4325 feet.

Gem Oil Company's Davis Holmes 4, A. Viesca Survey, topped the producing sand at 4318 feet and drilled to 4330 feet in that formation, where seven-inch casing was set. The well was completed for an estimated 470 barrels per day through a quarter-inch choke. Reading & Bates' Davis Holmes 2, in the same survey, topped the sand at 4354 feet and on a drill stem test from 4330 to 4360 feet, showed oil in eight minutes through a quarter-inch choke on top and bottom. The tester was open 10 minutes. Seven-inch casing was set at 4312 feet.

Between the Livingston field and the Sunshine area, J. Z. Werby's Wittforth et al 1, one mile north of the field, A. Viesca Survey, topped the Hockleyensis at 3286 feet, or 151 feet higher than in Howard 1. Top of the Cockfield was found at 4030 feet and on a drill stem test from 4065 to 4076 feet, the well showed 35 fourbles of salt water and one joint of mud with salt water through a half-inch choke on the bottom in 18 minutes. The operator is now coring ahead below 4076 feet. The elevation is 239 feet.

Alpha Petroleum Company's Kirby & West 1, west of Dick Schwab's gasser No. 2, in the G. S. Thomas Survey, was abandoned last week at 4911 feet. This wildcat started drilling in February, and the operators made a mystery well of it, as no markers were available. On the Hockleyensis marker the well was reported running about 30 feet lower than Dick Schwab's gas well. The well topped the Cockfield at 4770 feet, with an elevation of 169 feet. On the first drill stem test the well showed 3½ fourbles of mud and an odor of oil and gas, with no salt water, through a quarter-inch choke on top and bottom of tester, which was set 18 feet up in the pipe. It showed 700 pounds gas pressure in six minutes. The test was made from 4899 to 4911 feet. At 4907 feet the well tested 30,000,000 cubic feet of gas through a three quarter-inch choke, and one barrel of salt water, with a pressure of 2000 pounds. The operators cut and pulled the screen to drill deeper. The well was then shut in as a gas well, with a tubing and casing pressure of 1800 pounds. The well was drilled to 4911 feet where it was abandoned. Atlantic Oil Company was reported buying leases around the well site, paying an unreported consideration in cash and assuming an oil obligation.

Hankhamer Extension Test Abandoned Below 6000 Ft.

Houston.—Abandonment of Miramar Corporation's Stengler 1, located on the Liberty and Chambers Counties line, near Hankhamer, has given the immediate area a doubtful aspect. The well was drilled to 6025 feet. Miramar Corporation, The Texas Company and Humble Oil & Refining Company have practically the entire area south of Gulf Production Company's producing wells under lease. Miramar Corporation has discovered three new producing pay sands along the Gulf Coast since the first of the year, but was unsuccessful south of Hankhamer.

Texas Coast Completions Lower During Week

Houston.—Texas Gulf Coast completions took a downward trend during the past week, when compared with the previous week. Of the 20 completions, 14 resulted in flowing or pumping wells, with an initial production of 9568 barrels of oil per day. Six were reported as failures.

Completions along the Texas Gulf Coast for the past week were as follows:

Company, Well and Location	Init. Prod. Bbls.	Depth
BARBERS HILL—		
Mills Bennett, Fee C-3	192	5618
Sun, Wilburn 21	109	3915
CONROE—		
Houston Oil Co., Cartwright 9	744	5185
Humble, McComb 8	2016	5127
Moore 51	1872	5100
So. Tex. Dev. Co., A-63	1152	5176
GOOSE CREEK—		
Humble, Simms Sweet 27	96	4015
Imperator Oil Co., Harrell 1	*	4414
HANKAMER—		
Miramar Corp., Stengler 1	*	6025
HULL—		
Gulf, Phoenix 100	95	4100
LIVINGSTON—		
Owenby, Kinaes 1	406	4335
MANVEL—		
Texas Co., Leider 1	240	4040
THOMPSON—		
Gulf, Booth A-21	1440	5250
TOMBALL—		
Humble, Hoffman 1	576	5556
Theak 1	360	5584
The Texas Co., Hirsch 2	360	5611
HARDIN COUNTY—		
Frazier & Green, Sternberg 1, 2 mi nw Kountz, H&TB Sur. No. 283	*	6988
Recourse Oil Co., Sternberg O&G Co. 1, ne of Kountze, 466 ft w, 466 ft s of ne corner of L. Hicks 565 ac tr	*	....
NACOGDOCHES COUNTY—		
Dick Schwab, Rambin 1, 15 mi ne of Nacogdoches, J. Simpson Sur	*	4920
POLK COUNTY—		
Alpha Pet. Co., Kirby & West 1, w of Dick Schwab's No. 2, in G. S. Thomas Sur.	*	4911

*Failures; †Junked; ¶Million cu. ft. gas.

New Roanoke Field May Become Production Factor

Lake Charles, La.—The twenty-ninth oil field for the Louisiana Gulf Coast was opened last week when Shell Petroleum Corporations Kratzer 1, on the Roanoke prospect, Jefferson Davis Parish, came in for 47 barrels of 37 gravity pipe line oil per hour from 8682 feet. The wildcat has now increased to 50 barrels per hour, with a tubing pressure of 1440 pounds and a casing pressure of 1450 pounds. The oil is flowing through an 18/64-inch choke. At 8655 feet 2½-inch tubing was hung and at 8661 feet seven-inch casing was set. Nineteen feet perforated and one joint of blank screen was set at the bottom of the hole. Seventeen feet of oil sand was found from 8665 to 8682 feet. The company had installed two 1000-barrel tanks near the well and the oil is now flowing into this storage. The company owns 600 to 700 acres in this area.

Deep formations along the Louisiana Gulf Coast show tremendous possibilities, two discoveries during the past four weeks having shown a tendency toward deeper development. Production below 7500 feet has now been developed, and new and deeper zones may be found. Deeper development has become more important, and major companies are recognizing the lower formations as reserves of the first rank.

The Superior Oil Company's Hernandez 1, in Acadia Parish, Shell Petroleum Corporation's Kratzer 1, Jefferson Davis Parish, Gulf Refining Company's La Fourche Levee Basin District 1, Plaquemines Parish, have all uncovered new pay horizons in the past 30 days, and this should lead to some rapid deep development along the Louisiana Gulf Coast, which in the past has not attracted the attention it deserved.

On a drill stem test from 8659 to 8677 feet the well showed 400 feet of pipe that had been in 37 gravity oil, and a pressure of 70 pounds was developed in 12 minutes. The Kratzer well topped the Discorbis at 7652 feet, Heterostegina at 7977 feet, and Marginulina at 8363 feet. No salt water was shown at any time during the tests.

This well also set a Gulf Coast record in successfully cementing 9⅝-inch casing at 7527 feet. A 12¼-inch hole was drilled to this cementing point, and no trouble was experienced in landing the casing.

This important discovery well is producing from the deepest sands yet developed along the Texas and Louisiana Gulf Coast. Superior Oil Company's Hernandez 1, Acadia Parish, which is producing from sands found at 7845 to 7850 feet, is a deeper well but it is not producing from bottom. The bottom 166 feet is cemented off and the company has not yet drilled the plugs.

Humble Oil & Refining Company drilled two wells on the Roanoke prospect, but abandoned both, and it is reported that $250,000 was spent in trying to prove this area. The company missed the pay sand approximately 259 feet in Devilbiss 1, which was abandoned at 8423 feet. The wildcat tested salt water from 8249 to 8257 feet. It gave promise of becoming an oil well but after salt water was encountered, was abandoned. Humble Oil & Refining Company is reported to be making a new location on its large block in the Roanoke prospect. Leasing activity is very brisk with acreage selling from $300 to as high as $700. Royalty prices are also selling at unusual prices.

Six miles west of the discovery well, Kratzer 1, and between the Welch and Jennings field, Tide Water Oil Company's Aimea Bourgeois, Section 28-9s-5w, was drilling below 2000 feet at the close of the past week. This wildcat has taken on new importance with the discovery, being only six miles from the Roanoke area.

The Louisiana Gulf Coast in the past has been looked upon as holding an unimportant position as a controlling factor in the industry, and there is a tendency on the part of a few to regard South Louisiana as having little significance, either as to present development or as to future possibilities. But it has been shown in the last four weeks, through three deep discoveries, that the area is an important reserve.

In the immediate past, interest was along the Conroe trend, which is that area about 25 miles wide, running northeasterly through Beauregard, Vernon, Rapides and Avoyelle Parishes. At the end of last year The Texas Company controlled the greatest amount of acreage in the Louisiana Gulf Coast, followed by Humble Oil & Refining Company, with about half as much as the former. Now several of the major oil companies have entered the play and bought big blocks of acreage. One of the most important leases was a sub-lease by the Pure Oil Company to the Superior Oil Company of California, of about 7000 acres covering the Bosco block, at the junction of Acadia, St. Landry and Lafayette Parishes, Pure Oil Company retaining one-half working interest. The lessor began the drilling of a test on the block and four weeks ago completed it at 8916 feet for an initial production of 750 barrels of 40 gravity oil daily, the production coming from eight perforations in the casing at 7853 feet. No screen was set. In all, this hole had a total of about 13 showings of oil and gas. This new field is generally thought to surpass even the Iowa field, one of the major producing areas of this territory.

Superior Oil Company has already made six new locations on its block and is now moving in rigs. Standard Oil Company of Kansas, which has about 45 acres in this area, is now moving in material to drill a well south of the Superior Oil Company well.

Last year two new producing areas were discovered, the largest in Terrebonne Parish near the coast line, where The Texas Company completed the first commercial producer on Caillou Island dome. State 8 was completed at 5981 feet for an initial production of 2333 barrels of oil daily. The Texas Company's Nos. 9, 10 and 11, around the flanks of the dome, have resulted in the same type of producers and

A Large Assortment of

Fishing Tools

for your use

Enables you to use always the right tool for the job thus minimizing practically 100% the possible loss of your hole.

●

Gives you the same advantage as if you had this large investment in fishing tools without your having to carry the expensive overhead of such an investment and the expense of keeping the tools constantly in first class condition.

Our experienced operators who specialize in fishing and who have available the right tools for the job . . . save you time and money.

Phone: Wayside 2111 or Taylor 7674

GRAY TOOL COMPANY

6102 Harrisburg Blvd., HOUSTON, TEXAS

these four wells opened up three productive horizons, all producing from the Miocene age. No attempt has yet been made to determine the possibilities of the Oligocene formation. Rio Bravo Oil Company opened up a new producing area on Darrow Dome, on the Mississippi River and in Ascension Parish, with the completion of a 40-barrel pumper.

In the next three to five years the general map of the oil industry may shift toward this area. The outlook for development of a large reserve is very encouraging.

Lake Hermitage Prospect Looms As Next Oil Field

Lake Charles, La.—With the completion of Gulf Refining Company's La Fourche Levee Basin District 1, on the Lake Hermitage prospect in Plaquemines Parish, for a few barrels of oil from 4606 feet, open flow, a new oil field for the Louisiana Gulf Coast may be opened. This wildcat gives promise of proving up the prospect for oil production. The well failed to hold up as a flowing well from sands found at 4265 feet.

Beginning April 6, it produced 24 gravity oil at the rate of 55 barrels per day, open flow, for two or three days, and then ceased to flow. This was the first oil production established on the prospect.

The well was started by Texas Gulf Sulphur Company, which holds the sulphur rights on the Gulf Refining Company's large block. The well was taken over by the latter. This prospect was worked by Gulf Refining Company and Humble Oil & Refining Company with seismograph in 1928, and it is said that a dome was indicated.

Texas Gulf Sulphur Company has drilled a dozen or more wells in this area, south of New Orleans, and now that oil has been uncovered a new deep drilling campaign will be started. The wildcat is located 595 feet south and 75 feet east of the northwest corner of Section 12-18s-25e.

Hardin County Wildcat Abandoned at 6988 Feet

Houston.—Two miles northwest of Kountz, Frazier and Greer's Sternberg Lumber Company 1, H.&T.B. Survey, has been abandoned at 6988 feet. This Hardin County wildcat had a showing of gas at 1400 feet, and 10-inch casing was set at 1466 feet. Only a slight show resulted. Top of the Heterostegina was found at 3523 feet with an elevation of 77 feet, Warreni from 5189 to 5219 feet, Vicksburg at 5189 feet and Hockleyensis at 5849 feet. The well was then reported running high, as compared to the company's well south of this wildcat. Cockfield was topped at 6770 feet, Dibollensis at 6622 feet, and after coring 218 feet in the Cockfield, the well was abandoned. Several of the major oil companies hold large blocks in this area. The contract depth of the test was 6800 feet.

Northeast of Kountz, Recourse Oil Company's Sternberg Oil & Gas Company 1, was abandoned after making location. Alpha Petroleum Company has now taken over the Steinberger Petroleum Corporation's Weiss Estate 1, and will drill the well approximately 2½ miles northwest of Kountz, in the H. Williams Survey. It is reported that one of the operators paid $5000 in cash and $25,000 in oil for acreage 150 feet west of the Pharr well, on the east flank of the Sour Lake field.

Wilcox Oil & Gas Company is now rigging up on its north offset to the Frazier and Greer well, on the Sternenberg land.

On the east flank of the Sour Lake field, Pharr et al's Bernard 1, flowed fluid for four hours late last week through a three eighths-inch choke, with a tubing pressure of 600 pounds, but as soon as the operators installed a half inch-choke the well stopped flowing. It is reported that the well will be rewashed and screen reset.

Splendora Test Running Higher During Redrilling

Houston.—Steen Drilling Company's Texas Long Leaf Lumber Company 1, in the Splendora area of Montgomery County, is drilling in a new hole below 5963 feet. Top of the Cockfield was 5749 feet, or 72 feet higher than in the old hole, in which the formation was topped around 5821 feet. Gas sand was shown from 5817 to 5827 feet. On a drill stem test from 5827 to 5842 feet the well showed two gallons of distillate through quarter inch choke in 10 minutes. From 5957 to 5963 feet a sand was cored with a salty taste, with no shows of oil. Humble Oil & Refining Company's Texas Long Leaf Lumber Company 1, approximately 8000 feet north of Steen's well, was coring ahead below 4002 feet, having encountered no shows.

McElroy Oil Company's Grogan 1, six miles northwest of Goodwin, P. V. Hamblin Survey, has been abandoned at 5001 feet. This wildcat topped the Cockfield at 4620 feet and was reported running high on this marker, as compared to other wells in this area. A core taken from 4878 to 4905 feet showed a soft sand. At 4904 feet salt water was encountered. Top of the Hockleyensis was 3787 feet.

Ever Do Business With Native Sons ?

We don't know where you've dug and/or operated wells in your day, but we'll tell you one thing: You'll do well to look up the PELCO Gang if you operate in the Gulf Coast country. Not that you can't get along without us, because you can. But we're wise in the ways of this country. Some of the first equipment used in the old Caddo field in Louisiana had PELCO on it. The officials in many of our big producing companies wore overalls when we first knew 'em. If you want equipment made for the country where it's sold, or RIGHT for the country where it's sold whether we make it or not, look up the PELCO Store or send for the PELCO Gang in your field. We'll be seein' you in any event.

PELCO

PELICAN WELL TOOL & SUPPLY CO.

Lake Charles — Zwolle — Many — Monroe — Houma
Kilgore — Willow Springs — Houston — Refugio
SHREVEPORT, LOUISIANA

Increasing Developments in South Louisiana Continue

T. R. DEAN*

THE territory about to be discussed will be referred to as South Louisiana, and includes that part of the state extending from the north lines of Vernon, Rapides, and Avoyelle Parishes southward to the Gulf of Mexico.

The idea seems to be prevalent among those not so well acquainted with the conditions in South Louisiana that this state occupies relatively unimportant position as a controlling factor in the industry, and there is a tendency on the part of a few to a certain degree to disregard Louisiana as of any significance, either as to present conditions or as to future possibilities. It is true that we have no East Texas fields over here nor any West Texas fields, nor Kettleman Hills. However, the comparative importance of Louisiana has assumed such proportions that an examination will no doubt be a surprise, even to those who are more or less acquainted with the territory in a general way.

We will endeavor to present concise and official statistics on the major key subjects of activity throughout South Louisiana during 1933, as compared to the same in 1932, and there will be denoted a marked increase for 1933 in all phases of leasing, exploration, drilling, production, and crude purchases; signifying general betterments of conditions and the growing importance of South Louisiana as a factor in oil production, and a still greater increase to date in the present year.

As regards leasing activities, during 1933 it is estimated that in South Louisiana a total of approximately 2,000,000 acres was leased by various companies and individuals with total initial payments to the land owners of around $1,500,000. Some of this was surrendered after exploration; however, at the end of the last year it is known that at least 2,800,000 acres were actually under lease in South Louisiana, which was about 700,000 acres more than at the beginning of last year. These are conservative figures.

During 1932 chief interest was along the so-called "Jackson" or "Conroe" trend, which is that area about 25 miles wide, running northeasterly through Beauregard, Vernon, Rapides and Avoyelle Parishes; as induced by activities of Humble Oil & Refining Company and Sun Oil Company. During 1933 attention shifted in a more generalized way over the entire zone though some additional scattered leasing was done along the trend, mainly by Gulf Refining Company, in taking about 140,000 acres and also by The Texas Company and individuals.

At the end of last year, The Texas Company controlled the greatest amount of acreage in South Louisiana, followed by Humble Oil & Refining Company with about one half as much as the former, and in order thereafter Gulf Refining Company, Sun Oil Company and Shell Petroleum Corporation.

From the first of this year to the present date about 1,400,000 acres have been leased for around $950,000 and if the present rate of leasing activity is maintained at the end of this year we estimate a total of 3,500,000 acres will have been leased, a considerably greater total than from any previous year. For this year, Humble Oil & Refining Company is leading in amount of acreage acquired, followed closely by Gulf Refining Company.

Without regarding the trend play, there were a number of highly significant trades of major importance during last year which lack of time prevents us from discussing. One of the most important was the sub-lease by Pure Oil Company to Superior Oil Company of California of about 7000 acres covering the Bosco block at the junction of Acadia, St. Landry and Lafayette Parishes, Pure Oil Company retaining a one half working interest. The lessor began the drilling of a test on the block and three weeks ago completed it from a total depth of 8916 feet for initial production of 750 barrels of 40 gravity pipe line oil daily, the production coming from eight perforations in the casing of 7853 feet as no screen was set. In all, this hole had a total of about 13 showings of oil or gas to some degree and completion of the well established the presence of the new deep producing areas for South Louisiana, and its limits and possibilities are generally estimated to surpass even those of Iowa field, one of the major producing areas of this territory. Superior Oil Company is ready to spud six new tests on the block located in different directions from the discovery well and Standard Oil Company of Kansas is rigging up for a deep test to the south of the new producer.

With the threat of national control leasing activities became more apparent resulting in more exploration work during last year. In January of last year there were about 18 geophysical parties working in this territory. By the first of July the number had risen to 21 parties and during the latter part of December, 1933, it had reached 25 parties composed of nine torsion balance crews, 10 seismograph reflection troops, four magnetometers and two gravity meters. The number has been increasing still more this year. During the past week there was a total of 31 geophysical parties conducting exploration work in South Louisiana.

In line with added leasing and exploration work there was a corresponding marked advance in number of wells drilled. Although in the preceding year of 1932 there was a total of only 136 wells drilled in South Louisiana, composed of 58 fields and 78 wildcats and semi-wildcats; last year there was a total of 238 wells drilled, including 164 field wells and 74 wildcats and semi-wildcats, or a 76 percent total increase in number of wells drilled. And particular notice is called to the fact that the entire increase was from more drilling in established

*Before National Oil Scouts Association of America, Lake Charles, Louisiana, March 21, 1934.

$20 FIRST PRIZE

has been mailed Frank J. Campbell of Saybrook, Pennsylvania, for his winning picture of old well hook-ups in the O-C-T picture contest closed recently. This picture showed a Pennsylvania hook-up installed in 1882.

$10 SECOND PRIZE

went to H. R. Decker of Houston, Texas, for his well hook-up picture of the discovery well in the Humble, Texas, field.

$5 THIRD PRIZE

also went to H. R. Decker for a well hook-up picture of one of the earliest well hook-ups in the Humble field.

O-C-T appreciates the interest taken by those furnishing pictures in this contest.

OIL CENTER TOOL CO.

QUALITY O-C-T PRODUCTS

HOUSTON, TEXAS. U.S.A.

fields where production was more certain. Of the total wells drilled last year, one out of every three was productive.

Last year there were four wildcat wells drilled to 8000 feet or below, three were drilled to between 7000 and 8000 feet, and eight were drilled between 6000 and 7000 feet, or a total of 15 wildcat wells that went below 6000 feet.

It is also noted that crude purchases for last year or what might be considered the free oil produced in the territory decreased about 1,000,000 barrels from the amount of purchases in the preceding year, showing that more companies were taking their own oil as produced; also that total amount of production for last year was 15,388,000 barrels as compared to only 11,686,000 barrels for the preceding year, or an increase of 32 percent, or almost 4,000,000 barrels.

Therefore it can be seen that by considering that 76 percent increase in the number of wells drilled with the entire increase occurring in established fields rather than wildcats, together with additional facts that less free oil was produced in the territory regardless of an increase of 32 percent in production, it can be concluded a majority of the companies were in need of more oil than heretofore and took the necessary steps not only to try to do this result through increased drilling in proven territory but also by taking their own oil rather than allowing it to go to others. This is more strongly borne out by calling attention to the total available steel storage in South Louisiana at the beginning of this year of 2,833,600 barrels, with 65 percent of that lying empty and not in use.

Last year two new producing areas were discovered. The largest in Terrebonne Parish near the coast line, where The Texas Company completed the first commercial producer on Caillou Island Dome. Their State 8 well was completed from a total depth of 5981 feet for an initial production of 2300 barrels daily, and since that time this well has averaged between 1200 and 2000 barrels daily under a proration schedule. Subsequently three more wells, Nos. 9, 10 and 11, all drilled around the flanks of the dome, have resulted in the same type of producers. The classifications of The Texas Company indicates probably three productive horizons encountered thus in these four wells. No. 9 has 50 feet of solid sand at 4070 feet and No. 11 has 45 feet of solid sand at 3983 feet. Both are considered in the same and most shallow productive horizon. No. 8, the discovery well, is producing from 25 feet of solid sand and is considered in the lower horizon. No. 10 at total depth of 6094 feet, is producing from 74 feet of broken sandy shale having good odors throughout with no water indication and appears to be in a different horizon from the other three producers. All these horizons are of the Miocene age and no attempt has yet been made to determine the possibilities of the Oligocene below. This particular dome holds promise of as prolific production as any discovered in recent years, particularly in Louisiana.

The other new producing area was on Darrow Dome on the Mississippi River in Ascension Parish, with completion of a 40-barrel pumper by Rio Bravo Oil Company.

Present conditions presage from 1934 the greatest strides in all phases of the history of the development of Louisiana. More pipe lines are being laid or contemplated. Indications point to a higher degree of interest in development around a number of the old established salt domes as several of the major companies and individuals have already shown a tendency toward acquisition of flank acreage and drilling for off-side production. A gasoline is being considered at Iowa field. A new field has been discovered at Bosco by Superior Oil Company, indicating production as deep as 8916 feet, or within the Oligocene age. Shell Petroleum Corporation's Kratzer wildcat at Roanoke in Jefferson Davis Parish is in 18 feet of oil sand at a total depth of 8682 feet, and should open the second deep field of major importance for Louisiana within the past 30 days.

Heretofore developments have centered almost exclusively around shallower domes in South Louisiana. We share the opinion of some of the older oil men best informed on Louisiana that this is what may be termed as virgin oil territory, not only for deep production in the coastal area, as demonstrated at Iowa, Bosco and Roanoke, but also the Jackson and Conroe trend which can not be overlooked, and where no production has been discovered to date simply because there has not been sufficient exploration or drilling to furnish enough information for success.

Much greater advances have heretofore been made in Texas than in Louisiana, but no one will admit that the Sabine River marks a geological change that would nullify the same chances for South Louisiana as for the corresponding area through Texas. The same resources are over here and we invite your attention to the major discoveries which we expect to be continued in South Louisiana for the next three to five years that will affect the general outlook of the national industry.

REMOVABLE BOTTOM HOLE CHOKES

OTIS WELL TUBING PROCESS

MOVED

In order that we may better serve your high-pressure properties, we have moved our offices

FROM . . . .

The Slattery Building in Shreveport, Louisiana

TO . . . .

1113 Tower Petroleum Building, DALLAS, Texas. In placing Long Distance calls simply give the operator our address.

THE SOUTHERN STATES COMPANY, Inc.

NOW at: 1113 Tower Petroleum Building, Dallas, Texas.

Patentees and Operators.

Nacogdoches Wildcat Abandoned at 4920 Feet

Houston.—Dick Schwab's Rambin 1, 15 miles northeast of Nacogdoches, J. Simpson Survey, was abandoned late last week at 4920 feet. This important wildcat blew out at 3475 feet and was reported to have made five to eight barrels of distillate from 3680 to 3725 feet. A drill stem test was attempted but the seat failed to hold. From 3700 to 3720 feet salt water was found. Top of the Pecan Gap was found at 3045 feet and the base at 3695 feet. Wolfe City was topped at 3689 feet and the company drilled in that formation to where the base was found at 3725 feet. Austin chalk was topped at 4006 feet, base 4164 feet. The company drilled in the Eagle Ford at 4196 feet, with an elevation of 345 feet. Dick Schwab was reported to have spent $10,000 for additional acreage north of the well giving him a 13,000-acre block in that area.

South Louisiana Initial Production Holds Steady

Lake Charles, La.—Of the six completions reported along the Louisiana Gulf Coast during the past week, five were oil producers with an initial production of 3118 barrels of oil per day. One failure was reported. The completions follow:

Company, Well and Location	Init. Prod. Bbls.	Depth
LOCKPORT—		
Magnolia, Farquhar A-7	455	6540
LEESVILLE—		
Gulf, Allen Land 2	960	3695
SULPHUR—		
Union Sulphur, Fee 793	500	2959
VINTON—		
Vinton Pet. Co., Gordon 3	*	2848
JEFFERSON DAVIS PARISH—		
Shell, Kratzer 1, Roanoke prospect, Sec. 12-9s-4w, 660 ft s, 330 ft w of ne corner of nw¼	1200	8682
PLAQUEMINES PARISH—		
Gulf, La Fourche Levee Basin Dst. 1, Sec. 12-18s-25e	3	4604

*Failures; †Junked; ¶Million cu. ft. gas.

Lone Small Oil Producer In Louisiana Completions

Shreveport, La.—Only one commercial well was included among the nine completions recorded last week in North Louisiana. This was a 75-barrel pumper from the Annona chalk horizon in the Converse field, Sabine Parish.

Four interesting wildcats were among the abandonments, including tests in Bienville Parish, Caddo Parish, DeSoto Parish and Union Parish.

The Bienville test was abandoned as a dry hole at 3008 feet. It was a test for possible production on the east side of the Sabine Uplift.

An attempt to get production in the Annona chalk horizon at 2170 feet in the old Pleasant Hill field, Sabine Parish, that produces from the Fredericksburg at 3200 feet, ended in failure after use of chemicals in the first test treated in that field in the chalk.

Completions last week in North Louisiana follow:

Company, Well and Location	Init. Prod. Bbls.	Depth
BIENVILLE PARISH—		
Eastern Texas Prod Co., First National Bank of Gibsland 1, ne ne 15-17n-7w	*	3008
CADDO PARISH—		
Frank Melat et al, Lawhon & Bogan 1, se nw 12-16n-14w	*	2645
DE SOTO PARISH—		
A. F. Tarver, Barnhart 1, se ne 16-15n-13w	*	3720
NATCHITOCHES PARISH—		
J. B. Oil Co., Hankins et al, 67-10n-7w	†	850
SABINE PARISH (Converse)—		
Earl P. Halliburton et al, A. J. Burkett 2, sw se 9-9n-13w	75	1895
SABINE PARISH (Pleasant Hill)—		
Bridges Oil Co., Inc., O. F. Moore B-1, nw nw 5-9n-12w	*	2170
SABINE PARISH (Zwolle)—		
Lawson & Pace, C. Bilbray 1, se nw 32-8n-11w	*	2653
Monroe Prod. Co., Sabine Lbr. Co. 4, se nw 7-7n-11w, sec compl.	*	2426
UNION PARISH—		
George W. Ward & H. M. Jones, J. D. Miller 1, sw sw 16-21n-2e.	*	2562

*Failures; †Junked; ¶Million cu. ft. gas.

All of Louisiana Increase To Go to Coastal Area

Shreveport, La.—Dr. J. A. Shaw, director of the minerals division of the Louisiana Conservation Commission, said last week after being officially notified that Secretary of Interior Ickes had raised Louisiana's oil allowable for June to 83,000 barrels as compared to 74,600 barrels for April and May, that all of the increase would be applied in Gulf Coastal fields. His formal order setting allowables by pools will be issued about May 28.

Not a single well at present in North Louisiana is being pro-rated, Dr. Shaw said. There are 62 producers in the Converse field, Sabine Parish, with a daily average per well of 26 barrels. This field and Zwolle are the only fields in North Louisiana that have production not entirely confined to "stripper wells."

Dixie Field Extension Indicated Possibility

Shreveport, La.—Possibility that the erratic Tokio producing horizon of the old Dixie field of Caddo Parish will be extended two miles west was seen last week in J. T. Humphrey et al's J. C. Powell 1, SW NW SE Section 14-19n-15w. Owners reported a blowout of gas which was brought under control, in two feet of Tokio sand at 2382-84 feet under two feet of cap rock, and are arranging to set 6⅝-inch casing.

Plan Test on 18,000 Acre Block in Bossier Parish

Shreveport, La.—Rocky Mountain Syndicate, headed by L. M. Moffitt as trustee, has assembled a block of 18,000 acres in townships 21 and 22 north, ranges 11 and 12 west, Bossier Parish, and plan to start a test within a few weeks. The test will go to 3200 feet which is the depth that produces in the old Cartersville field in Bossier Parish. No tests have ever been drilled within the bounds of this block. The center of the block is about six miles from the old Plain Dealing "fluke" well that blew in in 1917, flowed several thousand barrels of oil for 24 hours and never could be revived nor any offsets made to produce. The block has been thoroughly gone over with geophysical instruments.

J. P. Evans, Shreveport operator, has completed a 20,000-acre block in Lincoln Parish in the Louisiana Basin between the Monroe and Sabine Uplifts and must spud a test by July 1. This block is in townships 17 and 18 north, ranges 3 and 4 west.

T. D. Sedberry has leased 640 acres of land in township 9 north, range 11 west, from John Woodley, Incorporated, this being near a test in Sabine Parish being drilled by D. D. Alexander on the Brown Estate 1, Section 9-9n-11w, now drilling below 3400 feet. Eastern Texas Production Company has taken a half interest in nearby holdings of East Texas Refining Company to this test.

Converse Field Activity Includes No New Starts

Shreveport, La.—Activity last week sagged in the Converse field, there being no new locations. Several tests which will make a special effort to get production in the Nacatosh marl at the 1500-foot level that recently added a good flowing well and in previous tests has shown longer lived production than the Annona chalk or Saratoga chalk in that field, are being contemplated. Halliburton et al plan such a test in Section 20-9n-13w.

A number of the chalk tests in Converse were using chemicals last week. In Section 9-9n-13w (Block 17 townsite), Lanier & Rogers' Paul 2 was being treated for the second time at 1952 feet. In the south tip of the field, Parker et al's Henderson 1, NE SE Section 29-9n-13w, was treated after an oil show at 1920 feet. This test logged Nacatosh marl at 1535 feet, Saratoga chalk at 1580 feet and Annona chalk at 1808 feet. Arrangements were being made to use acid for the third time in the chalk in Halliburton et al's Raymond 1, Section 8-9n-13w, a northwest outpost well. If this fails to bring pro-

duction the test may be taken to 3000 feet.

Calatex Oil & Gas Company is arranging to run formation tester at 3082 feet in Whitney 1, Section 4-9n-13w, to test possibilities of the contact of upper and lower Cretaceous.

J. T. Reese is drilling below 1900 feet in Slay 1, Section 9-9n-13w, the first of a series of three chalk horizon tests.

Woodbine Prospect Holds Chief Arkansas Interest

Texarkana, Ark.—Chief interest last week in southwest Arkansas was again centered on E. L. Young et al's R. M. Patterson 1, SE NE Section 5-19-28, Miller County, which was being cleaned out preparatory to setting casing. No formation tester has been run. This test whose total depth is 3667 feet several weeks ago created much interest after a reported coring of a sand showing oil at this depth in what was tentatively identified as Woodbine. Since then the test has been shut down while titles on the 6300-acre block have been cured.

A considerable leasing campaign still continues in that section where a dozen blocks were reported as assembled or being assembled the week before as a "play" was made for a possible fault extending northeast and southwest from the vicinity of the this test to a 4500-foot test being drilled by J. K. Wadley, Trustee, in Section 24-17-27. This test is now drilling below 3950 feet. Wadley recently sold a one-fifth interest on the 1235 acres immediately surrounding this test to Frank Buttram and E. R. Newby of Oklahoma City.

M. B. Ingalls is assembling a block in township 19 south, range 28 west, extreme southwest Miller County and The Texas Company is reported to have taken 2400 acres solid in townships 19 and 20 south, range 27 west.

El Dorado, Ark.—Marine Oil Company last week spudded another test for the Urbana district, Union County, and later was drilling below 500 feet. The test is W. B. Thompson E-3, located 265 feet north and 290 feet east SWc NW NE Section 10-18-13.

Mobile, Ala.—Rice Oil & Gas Company's Oakley Estate 1, SE NW SW Section 9-3n-29e, Houston County, Alabama, last week reported the coring of a sand at 1138-59 feet. Whether the sand showed any evidence of oil or gas was not announced. Ten-inch casing was recently cemented at 80 feet.

Plan Joint Development Of Big Florida Tract

Jacksonville, Fla.—Plans for a joint program of development of approximately 12,000,000 acres of land on and near the Ocala Uplift in Florida situated approximately between Tampa and Tallahassee, were discussed here last week by representatives of five major companies with officials of Mid-Florida Exploration Company which recently completed extensive geophysical exploration on this uplift.

Companies represented at the conference were Ohio Oil Company, Gulf Refining Company, The Texas Company, United Gas Public Service Company, and Atlantic Oil Producing Company. Governor Scholtz of Florida was present at the conference. No definite plans were announced following the conference.

Harold S. Foley of Foley, Florida, is president of Mid-Florida Exploration Company and William G. Blanchard is executive vice president.

Drill Pipe Float

LARKIN
DRILL PIPE FLOATS

No nut on top of valve to become lost.

Valve cannot drop down and shut off circulation as the valve assembly is provided with a cage in which there is a shoulder to support the valve seat.

RELIEVE STRAIN ON DRILL PIPE, WIRE LINES, AND DERRICK

. . . yet allow perfect circulation at all times.

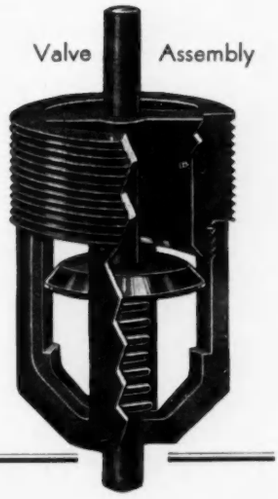
Prevent flowing through drill pipe, in case well should swab when coming out of hole.

BE SAFE . BE SURE . SPECIFY LARKIN

AT ALL SUPPLY STORES

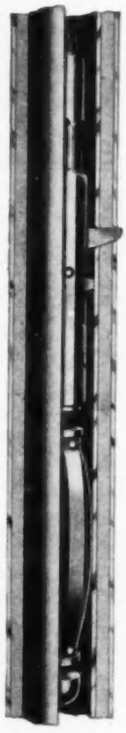
LARKIN
PACKER COMPANY
ST. LOUIS, MISSOURI

Warehouse Stocks at HOUSTON, TEXAS; OKLAHOMA CITY, OKLA., AND IN EAST TEXAS



Why not recover that sealed-off oil?

IT IS only when well spaced, correctly punched perforations extend *through to the oil-bearing formation* that you can secure *maximum, ultimate recovery.* That is why so many experienced operators specify "Baash-Ross"—to make certain of proper perforation—and profits!



Long Knife Perforator —

successfully perforates two strings of casing with cement between. It is operated either by the weight of the drill pipe, or with jarring equipment, and rapidly produces accurately spaced perforations. The long knife of the 6⅝" perforator penetrates 2¾" beyond the casing, with larger sizes securing proportionately greater penetration.

Double Star Wheel Perforator

operated with cable tools to punch two diametrically opposite rows of perforations through a single string of casing. The Single Wheel Type is run on drill pipe, and punches one row of holes. The distance between perforations is governed by the number of cutting points on the wheels. Even spacing and complete penetration are secured by positive mechanical methods.

BAASH - ROSS Perforator Service

in the Mid-Continent and in California, is furnished on a rental basis. Proper perforation by experienced Baash-Ross Service Men produces profits. Details and prices for Export will be promptly furnished upon request.

You can profit by using all of the modern Baash-Ross Tools required in your operations. We have a new catalog ready to send you—why not ask for it?

BAASH-ROSS TOOL COMPANY

Telephone 3-4406
1559 S.E. 29th St.
OKLAHOMA CITY

Telephone Hadley 6676
1301 Maury Street
HOUSTON

Telephone 599
BEEVILLE
TEXAS

SEE OUR DESCRIPTIONS IN THE COMPOSITE CATALOG

Gulf Coast Distributors: NORVELL-WILDER SUPPLY CO.

General Offices: 5518 Boyle Ave., Los Angeles, Calif. • *Export Offices:* 30 Church Street, New York, N.Y., U.S.A.

PETROLEUM DICTIONARY

By **HOLLIS P. PORTER**

Member of American Society of Mechanical Engineers, American Petroleum Institute.

This work grew out of a demand for some source of definition for the terms used by the petroleum industry. It contains 3,000 definitions of words used constantly by all phases of the petroleum industry. It was published early in 1931 and has found its way into engineering departments, legal departments and land departments of producing concerns, as well as to the desks of executives of the petroleum industry.

Manufacturers also find it valuable for reference. Advertising agencies find it a valuable addition to the library.

234 Pages, 6 x 9, cloth bound, Price Postpaid, $3.00
Send order to

THE GULF PUBLISHING CO., P. O. Box 2811, Houston

J. E. Shatford Reelected President of Refiners

Shreveport, La. — J. E. Shatford, Ouachita Valley Refining Company, El Dorado, Arkansas, was reelected president of the Louisiana-Arkansas Refiners Association at the fifth annual meeting held in Shreveport May 18. Mr. Shatford became president of the association about mid-year 1933 following resignation of C. M. Lamason.

Other officers elected at the annual meeting May 18 are: J. A. Welch, Louisiana Oil Refining Corporation, Shreveport, first vice president; Pleas O. Hardwick, Spartan Refining Corporation, Shreveport, second vice president; E. M. Burkefield, Louisiana Oil Refining Corporation, Shreveport, treasurer; and Leon C. Grosjean, Shreveport, reelected secretary.

The entire board of directors was reelected, it being composed of one representative from each member company. All comimttee members were re-appointed on the executive, budget, finance and manufacturers committees.

Following the meeting of this association, sessions were also held by regional code refiners groups 6-A and 6-B. The former group embraces the Louisiana Gulf Coast area including Alabama, and the latter includes North Louisiana, Arkansas, and Mississippi. Discussions were held of recent orders from Washington on gasoline quotas issued for June.

Group 6-A adopted a resolution asking that the executive committee of that group be allowed to set the individual company allowables for refineries in its area for June while Group 6-B asked that an allocator be appointed for this work.

Lea County Extension Well Will Make Producer

Hobbs, New Mexico.—Rated at 250 barrels daily, The Texas Company's J. S. Lea 1, located about 2½ miles north of the Lea-Lynch field, Lea County, was drilling below 3576 feet late last week with no appreciable increase in production. This wildcat topped a brown sand section in the lime at 3556 feet last April 13, while carrying considerable open hole. It gave promise of making a larger producer and flowed by heads before landing 6¼-inch pipe at 3536 feet, or 129 feet above sea level depth. A showdown on the value of the strike was deferred more than a month in order to install tanks and a pipe line connection. Lea 1 is located in the SWc NW Section 14-20s-34e, and near the center of approximately 20 sections of federal permits held by the company.

Phillips Petroleum Company is preparing to expand its operations in Lea County, supposedly for the purpose of

eventually building a pipe line to its large refinery at Borger, Texas Panhandle. The Borger plant is the principal source supply for the gasoline transported by the company's gasoline line to Kansas City and intermediate points. Phillips Petroleum Company is concluding a deal that will give it operating control of 940 acres of leases held by Pure Oil Company around the wildcat oil producer completed north of the Jal district by General Crude Oil Company and Magnolia Petroleum Company's A. E. Meyer 1, NEc SE Section 22-24s-36e, rated at 5000 barrels daily from saturated lime at 3501-3508 feet.

Company, Well and Location	Init. Prod. Bbls.	Depth
JAL FIELD: LEA COUNTY—		
Barnsdall Oil Co., M. Forrest 1, nec w½ sw 24-25-36	25	3331
MONTANA		
GLACIER COUNTY—		
Montana Power Gas Co., S. H. Neill 1, cne 20-35n-5w	150	3010
Santa Rita Oil & Gas Co., Hardy 1, Lot 5, 27-35n-6w	135	2903
Cardwell 3, Lot 2, 15-35n-6w	37	2916
WYOMING		
WESTERN COUNTY—		
Albert Jones, Osage 6, nw se 21-46n-63w	5	450
C. L. Nichols, Osage 5, se se nw 8-46n-63w	4	267

*Failures; †Junked; ¶Million cu. ft. gas.

Producer Connects Two Cut Bank Oil Areas

Cut Bank, Mont.—The territory between the Cut Bank field proper and the South Cut Bank area was proved productive this week when the Montana Power Gas Company's S. H. Neill 1, CNE Section 20-35n-5w, a linking location, swabbed 150 barrels in 12 hours after drilling into the pay at 2983-3008 feet. The well is three miles south of the company's Simero 1, southernmost producer in the field, and six miles north and a little east of The Texas Company's State 1, discovery well in the South Cut Bank area.

The well is located on what was termed by one faction of geologists as a low between Cut Bank and South Cut Bank structures, and on what was considered by another group of geologists as a continuation of a shore line sand southeast from the Cut Bank field to South Cut Bank. The well is considered now to have definitely linked the productive areas, and ranks Cut Bank as one of the largest territorial fields in the world. The new proved limits are 25 miles in length and an average three miles in width. The new well is 2½ miles southeast of the town of Cut Bank, and indications are such that the Cut Bank sand extends under the town so that town lot drilling in Cut Bank will be underway in the near future.

Lovell, Wyo.—Sidney H. Keoughan is rigged up with rotary to drill deeper from 2885 feet to the Madison lime in Taylor Oil Company's Hoskins 1, SE SE Section 25-56n-97w, in the Byron oil field, Big Horn County.

Torchlight Oil Corporation is plugging back from 4165 feet in the Madison to test the Tensleep sand at around 3500 feet in its test in the SW SW SE Section 19-51n-92w, Torchlight field, Big Horn County. The test showed for good commercial production in the Madison but was unable to shut off water stratum after it had cemented the four-inch string at 4000 feet and above the water and oil. It penetrated 80 feet of saturated Tensleep on its way down to the Madison.

Frannie, Wyo.—Henderson Producing Company will drill deeper from 1714 feet in its Government 3, NW SE NE Section 31-58n-99w, in the Elk Basin field, Park County, northern Wyoming. This test has been shut down for the past four years and had a show of oil at that depth.

THIS BOOK HELPED ME SAVE MY FIRM HUNDREDS OF DOLLARS

New Enlarged Edition Now Ready for Engineers, Designers, and Welding Users

Procedure Handbook of Arc Welding Design and Practice **is the most complete book of its kind ever published. Used by many prominent engineering schools. Sale of original edition broke all records. The new enlarged edition contains nearly 500 pages of accurate data and information on arc welding, its applications and design procedure for most efficient use of the process, amply illustrated with detailed drawings and photographs.**

Printed on fine paper with semi-flexible binding of simulated leather gold embossed; size 6x9in.

$1.50 POSTPAID IN U.S.A.

Foreign Postage 50c extra

Order your copy from

THE GULF PUBLISHING COMPANY

P. O. Box 2811

HOUSTON, TEXAS

"Pacific Precision means a Perfect Pump"

PUMP PACIFIC WORKS

Economy

IN PRODUCTION IS ASSURED WITH

Pacific Pumps

Pacific representatives stress economical production. Operating economy is a result of correct design, finished machine work and experience in the selection of materials which resist wear under severe pumping conditions. The extreme accuracy in a Pacific Pump assures interchangeability, close adherence to A. P. I. Standards and a new record of operating economy in your well.

There are four different types of Pacific Pumps available in any A. P. I. size or length. Insert Liner Pumps, Traveling Barrel Insert Liner Pumps, Regular Liner Pumps, and "Oil States" Insert Pumps. Each one is designed and recommended for a specific Pumping condition. Write for bulletins.

PACIFIC PUMP WORKS

Huntington Park, California

MID-CONTINENT PUMP SUPPLY CO.

Tulsa Oklahoma

PACIFIC LINER PUMPS

Cut Bank Drilling Continues Increase

Cut Bank, Mont.—Drilling operations in the Cut Bank field continue to increase with four new tests started while two wells were completed for better than average Cut Bank producers.

R. C. Tarrant's Emma Britton 3, CNE SW Section 12-34n-6w, drilled through 25 feet of saturated sand at 2762-2787 feet and had 1500 feet of oil standing in the hole which swabbing failed to lower in six hours in which 50 barrels of crude was recovered. It is estimated at better than 100 barrels daily on the pump. Nedeau Brothers' Van DeMark 2, SW NW Section 35-35n-6w, drilled into the pay at 2881-2903 feet and swabbed 90 barrels initial.

The new locations released this week are: R. C. Tarrant's Britton 4, CSW SW Section 12-34n-6w; Indian Oil Company's Reickoff 1, SE SE SE Section 3-34n-6w, and Reickoff 2, SW SE Section 3-34n-6w; and Olive Oil Company's Mattson 1, NW NW Section 14-34n-6w.

Several wells were drilling at critical depths at the close of the week and are due for early completion. Montana Power Gas Company's S. H. Neill 1, CNE Section 20-35n-5w, is drilling at 2930 feet. This test is considered one of the most important locations in the Cut Bank district. It is located three miles south of the company's Simero 1, southernmost producing well in the field proper and six miles north of The Texas Company's State 1, producing well on South Cut Bank. Outcome of Neill 1 will have a definite bearing as to whether South Cut Bank is a continuation of the Cut Bank field or is a separate oil structure.

The Texas Company's Antrim 2, C Lot 1, Section 34-35n-6w, is bailing down rotary mud with seven-inch production string set on top of the lower Cut Bank at 2901 feet, and Carrie O. Long 1, NW SW Section 23-35n-6w, is cementing production string at 2800 feet after coring saturated sand between 2800-13 feet.

Santa Rita Oil & Gas Company is drilling out plug in two tests: Cardwell 3, C Lot 2, Section 15-35n-6w, with casing at 2887 feet; and Hardy 1, Lot 5, Section 27-35n-6w, with 6⅝-inch string set at 2867 feet.

Two Carbon County Tests Have Resumed

Rawlins, Wyo.—Mahoney Dome Syndicate's Hughes Royalty 1, NE NE Section 25-26n-98w, in the Mahoney Dome field, Carbon County, is fishing for string of tools lost at 4030 feet. The test which has been shut in for the past several months recently resumed. The derrick, which was blown down in a windstorm, has been rebuilt, and operators expect to drill another 100 feet into the Sundance formation. Test has an estimated 100 barrel showing of oil at the present depth.

Producers & Refiners Corporation's Wertz 4, SW SE Section 7-26n-89w, Wertz Dome field, Lost Soldier district, Carbon County, is redrilling below 2900 feet.

Locate Offset to Famous Colorado "Ice Cream" Well

Walden, Colo.—Continental Oil Company released an important location this week in Rosa Hoye 3, NE NW NE Section 34-9n-78w, on North McCallum Dome, Jackson County. The new test is a location to the northwest of the discovery well, Rosa Hoye 1, the famous "ice cream well" which snowed a lemon colored flakey crude over the derrick top when it blew in for 50,000,000 cubic feet of carbon dioxide gas and an estimated 200 barrels daily of high gravity crude in 1929. The operators will meet perplexing drilling problems in Hoye 3, which is scheduled to drill through the carbon dioxide sand at 4800 feet in the Wall Creek series, and test for oil in the Dakotas. Hoye 1 has never been successfully completed because of the terriffic freezing powers of the carbon dioxide gas which drops 110 degrees below zero on expansion from its release under rock pressure. The freezing gas split the production string in numerous places and until the past summer the gas leaked up from fissures in the ground for a radius of 150 feet around the well. A year ago at this time Continental Oil Company went back into Hoye 1 and by a series of pilot holes drilled around the casing pumped cement into the fissures and after 14 separate cementing jobs succeeded in sealing the leaks so that the well was brought under partial control.

Shelby, Mont.—Bruce P. Radigan resigned this week his office as Montana State Oil and Gas inspector and has entered into the active development of the new Devon pool, east of here. Radigan has taken part of the acreage C. Leonard Smith, 240 acres in the W½ NW and SE Section 17-32n-2e, on which is located McDonnough 1, NW NW NW Section 17-33n-2e, and has moved in drilling machine for McDonnough 2, NW SE Section 17. The new pool was brought in several weeks ago by C. Leonard Smith's Mowitt 1, SW SW SE Section 7-33n-2e, which pumped 10 barrels initial of 44 degree gravity oil from 1173-80 feet. The oil commands $2 per barrel in the Montana market, and drilling costs are about $2000 per well when put down with a machine.

Two Small Shallow Wells in Osage Field

Osage, Wyo.—Two small completions were made in the shallow sector of the Osage light oil field, Weston County, this week. Albert Jones' Osage 6, CWL NE SE Section 21-46n-63w, is a four-barrel pumper from 430 feet. C. L. Nichols' Osage 4, SE SE NW Section 8-46n-63w, is a five-barrel well from 267 feet. Chadron Osage Oil Company's Osage 25, CNL SW SE Section 14-46n-64w, is standing with casing cemented. Homestake-Osage Oil Company's Osage 4, CNL NW SE Section 13-46n-6w, is cementing production string. Carl Cundy's Osage 8, SE NW NE Section 31-46n-63w, is spudding. C. L. Nichols is moving in tools for Osage 5, SE NW Section 8-46n-63w.

Lander, Wyo.—Kinney Coastal Oil Company has cleaned to bottom Chatterton-Weeks 1, SW NE Section 22-3n-1w, in the Pilot Butte field, Freemont County, and is drilling ahead from 3820 feet to test the Lakota sand at around 4000 feet. The well was completed as a 50,000,000 cubic foot gasser in the Muddy sand a year ago after plugging back from 3790 feet to 3820 feet.

North Belridge Well Completed; Large Flow

Bakersfield, Calif.—North Belridge has further established itself as one of the leading fields of the San Joaquin Valley, recent developments pointing to a steady production over a long period. Belridge Oil Company has completed No. 35-27 with an initial production of 6000 barrels from 5425 feet, the producing sand being the Temblor of the Miocene group. This was the discovery zone, and bulk of deep production has been developed between 5000 and 5500 feet.

Deep production at North Belridge is a very light oil, while the original shallow production was a heavy crude. Desirability of this type oil has led to a steady but conservative development program. Belridge Oil Company and Associated Oil Company hold the principal producing leases, but Continental Oil Company, Ohio Oil Company, The Texas Company, Richfield Oil Company and Union Oil Company have edge leases.

Los Angeles Basin Fields Show Limited Development

Los Angeles.—Los Angeles Basin fields contributed little of interest to developments of the past week. Flurries of drill-

ing have about passed, and most of the drilling is in a few settled fields.

Three wells were completed at Long Beach, but the total initial production was less than 1100 barrels. This field continues to be the only threat to curtailment in the Los Angeles Basin. It has not been unusual to complete 400- and 500-barrel wells in this field since January 1, despite a development which would have over-developed most areas.

Interest in deep zone development at Montebello has "cooled" considerably, as the result of several unfavorable discoveries of the past month. It now looks as if the 7000-foot zone will be a thin producing horizon of limited importance.

A good oil sand has been cored below 6800 feet in Wilshire Oil Company's Country Club 1, Potrero well that may start additional drilling. This test has been drilled to 6900 feet, and a string of casing may be run for a production test. This field has been a spasmodic producer since 1928.

Los Angeles. — Vance Development Company will drill a wildcat well in Section 25, near Artesia, with the hope of developing production above 6000 feet. This immediate area has not been extensively drilled, but one well nearby was abandoned several years ago at 5232 feet.

California Completions Are All Commercial Producers

Los Angeles.—Sixteen completions reported during the week had a combined initial production of 23,881 barrels. No failures were recorded. Average initial production in the settled fields was high. Completions in all California fields follow:

CALIFORNIA

Company, Well and Location	Init. Prod. Bbls.	Depth
KETTLEMAN HILLS—		
Kettleman North Dome, No. 78-20J	1600	8640
Standard Oil Co., No. 8-27J	3890	8250
BELRIDGE—		
Belridge Oil Co., No. 35-27	6000	5425
KERN COUNTY (Mountain View)—		
A. T. Jergins, Tr., Nance 1	3576	5714
SANTA BARBARA COUNTY (Elwood)—		
Carolina Spaulding, No. 93-8	2180	3682
SANTA BARBARA COUNTY (Meca)—		
Fred Cole, Perkins 1	1500	2119
VENTURA COUNTY (Avenue)—		
Associated Oil Co., Lloyd 52 Recompletion	115	7336
Shell Oil Co., Taylor 78	1500	7181
KERN COUNTY (Mt. Poso)—		
Union Oil Co., No. 11	510	1780
DOMINGUEZ—		
Shell Oil Co., Reyes 50	1100	6200
HUNTINGTON BEACH—		
Centralia Oil Co. No. 3 (was C. J. Laughlin No. 2)	125	4725
LONG BEACH—		
Dunlap, D. D., No. 8	370	4975
Edmar Oil Co., No. 1	375	4800
Selili Oil Corp., No. 1	75	4550
Wil-Daw Oil Co., No. 2	165	3900
WEST COYOTE—		
Standard Oil Co., Murphy-Coyote	115 800	6057

*Failures; †Junked; ¶Million cu. ft. gas.

Mountain View Assumes More Important Position

Bakersfield, Calif. — The Mountain View field now looks as if it will become a much more important producing area than was indicated during early development. Developments last week tend to confirm the opinion that operators who have held on in the face of several discouraging periods will come in for a good settled production. The field will undoubtedly be much larger, both in acreage and production, than several companies that were slow to become interested anticipated.

The outstanding completion during the past week was A. T. Jergins Trust's Nance 1, which came in with an initial flow of 3576 barrels from 5713 feet. The 8⅝-inch water string was cemented at 5403 feet. The oil was 30.6 gravity and showed a cut of only one tenth of one percent. This was by far the best well yet finished in the field, and has encouraged operators who have been having trouble.

Completion of Barnsdall Oil Company's Mott 1 will necessitate drilling of two offset wells by Hogan Petroleum Company. By use of a new electrical logging device, Barnsdall Oil Company was able to complete Mott 1 as a commercial producer.

The field has been recognized by several large companies that first refused to join in the rush for leases. First wells were completed with much difficulty, but it may be possible to solve the water problem on leases which were formerly avoided.

Mountain View was a semi-geophysical discovery, a structure having been indicated by both seismograph and torsion balance prior to development.

North Dome Completion Shows Water With Oil

Coalinga, Calif.—Two average producers were completed during the past week on the North Dome at Kettleman Hills. One well showed a good percentage of "free" water, but a small amount of water has not been unusual in completions of the past.

Kettleman North Dome Association completed No. 78-20J as a 4150-barrel producer from 8640 feet. A flow of 572 barrels of water accompanied oil production. The 9⅝-inch water string was cemented at 7655 feet.

Standard Oil Company's No. 8-27J was completed at 8250 feet as a 4000-barrel producer. Due to location of this well, the 9⅝-inch water string was cemented at 6737 feet.

Middle Dome Corporation's No. 58-19V, a Middle Dome test, is drilling in hard brown shale at 6100 feet. Well is checking closely with the two wells drilled some time ago. Top of the oil sand is expected at about 7400 feet. This test is being drilled under contract by Petroleum Securities Company, a Doheny organization.

Demand for Heavy Oil Aids Kern County Fields

Bakersfield, Calif.—Demand for certain types of heavy crudes produced in Kern County fields has led to increased activity at Mt. Poso and Kern Front. Oil from the former field yields a gasoline high in anti-knock rating, and steady development has been carried out during the past year. These oils yield only a small amount of gasoline on a straight-run test, but addition of a percentage in cracking stills has been practiced.

Union Oil Company completed S. & M. 11 in the Mt. Poso field with an initial production of 510 barrels of 16.4 gravity oil from 1780 feet. This field has some of the largest pumping wells in the state. Use of large tubing in these shallow wells has resulted in a production of as much as 1000 barrels daily.

Steady Drilling Features Few Coastal Area Fields

Santa Barbara, Calif.—Coastal fields have no especially interesting developments under way, but drilling in three or four areas will continue at the present rate unless acted upon by some factor not now in evidence.

Shell Oil Company completed Taylor 78, an edge test at Ventura Avenue, with an initial production of 1500 barrels from 7191 feet. The oil showed a cut of only three percent, a lower water content than is ordinarily recorded in inside wells.

A 700-barrel well was completed at Elwood by Caroline Spalding and Pacific Western Oil Company, this tideland strip having been very productive.

The Santa Barbara Mesa field, regarded by major operators as unworthy of attention, continues to attract the attention of the smaller companies. A 650-barrel well was completed last week by Fred E. Cole, an independent operator who has had some success in the field. This well was drilled to 2119 feet. The oil was only 17.4 gravity, but a well may be completed in a short time and at little expense.

Michigan Gas Survey Undertaken by State

Mt. Pleasant, Mich.—A survey of Michigan's natural gas reserves and potentials as developed, ordered two months ago by Governor William A. Comstock, in an effort to force lower gas rates, determine whether permits shall be granted for additional pipe line outlets and to find whether greater markets are justifiable, was under way this week.

Edward Rawlins of Bartlesville, Oklahoma, of the U. S. Bureau of Mines, and F. R. Frye of the Michigan Conservation Department, started preliminary field surveys this week.

June 6 has been set as the first formal meeting of the newly appointed executive and advisory committees, which will assist the Public Utilities Commission and State Engineering Department to set up rules governing the production, transmission and distribution of natural gas. The committees are as follows: Manfred K. Toeppen, chief consulting engineer of the commission; Charles E. Gauss, insurance commissioner; R. A. Smith, state geologist; and Oscar G. Olander, director of public safety.

Chairman of the production sub-committee is Don R. Mitchell of Detroit, president of Fuel Oil Corporation; transmission—H. S. Gentry, geologist and gas engineer, Mt. Pleasant; distribution—T. F. Older, manager of the Ypsilanti municipal gas department; consumers—William Shakespeare, mayor of Kalamazoo.

Michigan New Drilling Takes Upward Spurt

Mt. Pleasant, Mich.—Seventeen new starts, 10 by The Pure Oil Company, in Michigan for the week set a new weekly high for the past two months. The comparatively higher number of new operations was believed the result of prospects of larger markets for Michigan crude and interest in the Montcalm County testing play.

Rock Springs, Wyo.—Mountain Fuel Supply Company is drilling out plug in Union Pacific 2, SW SE Section 11-19n-104w, in the North Baxter Basin gas field, Sweetwater County. The 6⅝-inch string is set at 3132 feet. The test cored to 3194 feet and showed for a good gas well. The company's Florence Wilson 3-B, CSE SW Section 15-12n-100w, is coring the Wasatch formation at 2776 feet with gas showing. It will drill a second test, Florence Wilson 4-B, NE NW Section 23, in the Hiawatha Dome gas field, Moffat County, Colorado, on the completion of Wilson 3-B.

This 'short-cut' location *saves* Time *and* Money *in* New York . . .

The Piccadilly is "close to everything." Ninety per cent of your calls are within a few minutes' radius of this new hotel, and its short-cut location will save time (and taxi fare) in covering the town.

And when you need relaxation, you are right in the center of theatres and amusements . . . to say nothing of the Piccadilly's own "Silver Lining" Cocktail Room *Perfect.* De luxe dinner or supper, with dancing in the Georgian Room, for one dollar!

The Treasurer himself will applaud your keen sense of values in choosing this hotel, where comfortable rooms and delicious meals are bargains.

RATES FROM

$2.50

ROOM WITH BATH
450 Outside Rooms

Hotel PICCADILLY

45TH STREET, WEST OF BROADWAY

NOW UNDER ARTHUR LEE DIRECTION

Michigan Proration Board Will Revise Allocations

Mt. Pleasant, Mich.—As a consequence of a 1500-barrel daily increase in the Michigan allowable oil runs, effective June 1, the Michigan Producers Proration Committee this week will work out new allocations and prorations by pools for the state, Chairman James C. Graves announced. The new federal allocation is 32,800 barrels daily. During May, Michigan has been operating on a seven percent prorate with a minimum 100-barrel exemption.

For the week ending May 19, Michigan runs totaled 32,750 barrels daily. Of this the Porter area run 22,618 barrels daily.

Hearing on Austin Gas Line Outlet Is Postponed

Mt. Pleasant, Mich.—A hearing called by the Michigan Public Utilities Commission May 16 at Lansing for the American Michigan Pipe Line Company, subsidiary of the American Light & Traction Company, to show cause why its certificate of convenience and necessity for construction and operation of a gas pipe line between the Austin (Mecosta County) pool and Muskegon and environs should not be permanently suspended was adjourned until June after a preliminary hearing.

The pipe line company was granted a certificate by the utilities commission February 14, 1934, and had until April 15 to begin operations. No progress was made, it was claimed. The company was reported waiting until the field, opened a year ago, was further proven. When the certificate was granted the company showed a 15-cent transmission charge and 15 cents at the well. The utilities commission in citing the company to appear took the position that it must regulate the transmission charge if it is to retain control over the distribution rates. The commission contends that the 15-cent transmission charge is too high.

The hearing was adjourned after the company indicated that it would bring in additional rate statistics. Operating under a "home rule" charter, Muskegon rates are fixed by the city government and not open to the utilities commission. However, the state body may control the transmission charge to the city gates and has the power to grant or reject pipe line permits.

The American Michigan Pipe Line Company proposes to construct a 55-mile line from the Austin gas field to Muskegon. The line would cost approximately $500,000. It would be the first commercial outlet for gas in the field.

Michigan State Lands Offered for Development

Mt. Pleasant, Mich.—The Michigan State Conservation at its May meeting authorized the sale of oil and gas leases on 5320 acres of state-owned land in Isabella, Gladwin, Ogemaw and Oceana Counties. The Lands Division has set June 1 as the date of the sale.

Lands included in the sale will be 320 acres in Isabella County, 3360 acres in Gladwin County, 1400 acres in Ogemaw County and 160 acres in Oceana County.

Michigan Refinery Will Start Operating June 20

Mt. Pleasant, Mich.—The Mid-West Refining Company will begin operations at its new refinery in Alma, Michigan, June 20, or shortly after according to an announcement this week by Ben J. Skinner, general manager. The plant has a top capacity of 2000 barrels but probably will not handle more than 1200 barrels for some time, however.

Negotiations were reported completed between the company and Pure Oil Pipe Line Company for the delivery of oil from the Porter field to the plant. The refinery will operate the pipe line from the field to the refinery, however.

Old Abandoned Oil Test Revived as Gas Producer

Mt. Pleasant, Mich.—Uhl-Sarver-Raymer's McManaman 1, wildcat test in SE NW SE Section 31, Vernon township, Isabella County, originally drilled to 4555 feet in 1930 for an oil test and abandoned as a failure, has been recovered as a natural gas well in the Michigan Stray sand at 1505 feet. Gas flow was gauged at 1,788,000 cubic feet after drilling out plug to gas sand depth.

McManaman 1 is located three miles west of the Vernon gas field and is likely to cause new gas development interest in that part of the township. When originally drilled gas production was estimated between a half and a million feet but the hole was drilled wet and no accurate gauge made at the time.

Chief wildcatting interest in Michigan continues to center on testing of the Mecosta-Montcalm structure with seven tests either drilling or on location and 10 others reported projected. None of the active tests are below the drift, however, and it probably will be two weeks or more before test depths are reached.

Pure Oil Company has started core testing operations in Fremont township, Isabella County, southeast of the Broomfield gas pool, which if indicative of structure probably will bring exploration in that area.

Isabella Oil Development Company expects to renew drilling operations next week on the Bartlet-McClintic 3, Isabella County, Broomfield township, Section 3, for a Dundee lime oil test. It failed to produce gas in commercial quantities and if drilled deeper will mark the second test in that township to go below the Michigan Stray gas sand horizon. Two months ago The Pure Oil Company deepened Willie 2, Broomfield township, Section 4, to 3668 feet and plugged back to 3660 where it was treated to a 500-foot oil show and completed with an estimated 15 to 25 barrels daily on the pump. It is shut in.

Small Gas Well Extends Broomfield Pool Production

Mt. Pleasant, Mich.—A half mile southeast gas extension test to the Broomfield pool completed for 894,000 cubic feet in the Michigan Stray sand series was the highlight of development in Michigan for the week. Only five completions were made over the state, although approximately 125 tests, exclusive of wildcats, are active. It was the first week in several months that the Porter township area fell to only one light completion.

Drilling activity in the Porter area probably will reach its peak this month and in June unless new extensions are opened up. The Pure Oil Company has launched a big drilling campaign which will clean up most of the inside locations this summer. Some 60 wells are scheduled for drilling. This campaign will bring considerable other development in the area by offset acreage holders.

G. W. Olsen's Nicholson 1, Isabella County, Broomfield township, NW NW Section 14, a half-mile southeast of the main producing area of the Broomfield gas pool, was completed at 1328 feet for nearly 900,000 cubic feet of gas daily, indicating an extension of the field to the southeast. A year ago Shell Petroleum Corporation drilled Fritz 1, Section 13, Broomfield, a half-mile southeast of the Nicholson test, which showed for a half million feet but it was abandoned.

Completions:

Company, Well and Location	Init. Prod. Bbls.	Depth
MIDLAND COUNTY—		
Pure Oil Co., Novak B 2, Greendale twp., ne se ne sec 18	150	3570
J. Mark Harvey, State Bank 2, Porter twp., sw se se sec 8	25	3430
ISABELLA COUNTY—		
G. W. Olsen, Nicholson 1, Broomfield twp., nw nw sec 14	¶¼	1328
OGEMAW COUNTY—		
T. F. Caldwell, Hart 1, West Branch twp., nw sw ne sec 19	30	2700
Pure Oil Co., Schulty 1, West Branch twp., ne nw ne sec 29	*	1776

*Failures; †Junked; ¶Million cu. ft. gas.

31 Eastern Completions Include 16 Oil Producers

Cleveland, Ohio.—Ohio, with 31 completions reported, including 10 oil producers, was revealed as the most active in the Eastern area for the past week. Only Kentucky and West Virginia appeared with Ohio. In all there were 43 completions of which 16 were oil wells, 11 made gas and 16 were failures.

Details of completions follow:

WEST VIRGINIA

Company, Well and Location	Init. Prod. Bbls.	Depth
RITCHIE COUNTY—		
Beech Run Oil Co., Neeley 1	¶	1637
Burgy & Co., Husher 1	*	2200
WETZEL COUNTY—		
The Wiser Oil Co., Yoho 2	¶	2279

SOUTHEASTERN OHIO

MONROE COUNTY—		
Ellis Hay & Co., Hartshorn 2	*	....
E. G. Cunningham & Co., G. & A. Reed 2	*	1274
Hays Bros., Hartshorn 4	¶	1180
Hill Oil & Gas Co., Jas. McCaslin 10	¶	1630
MORGAN COUNTY—		
Ohio Fuel Gas Co., Harris 1	¶	1410
NOBLE COUNTY—		
Mercer O&G Co., M. Crum 13	*	226
Peaker & Walters, Brinkmier 2	*	795
WASHINGTON COUNTY—		
Phillips & Co., Greenlees 1	*	701
Martin Bros., Ella Martin 23	*	644

CENTRAL OHIO FIELD

ASHLAND COUNTY—		
Robinson & Co., W. S. Wolf 8	10	699
ATHENS COUNTY—		
Gus Townsend, Fee 1	¶	1668
BELMONT COUNTY—		
Robert Morgan & Co., F. A. Magee 1	*	1878
GALLIA COUNTY—		
H. W. Bowers, B. & C. Mink 5	¶	326
GUERNSEY COUNTY—		
Muhlback & Co., Jenkins & Co. 1	*	1215
Jewell & Muhlback, Jesse Milhone 1	16	3613
HOCKING COUNTY—		
Preston Oil Co., Sunday Creek Coal Co. 198	15	3566
KNOX COUNTY—		
H. E. Perkins, T. & M. Moore 1	¶	2626
MEIGS COUNTY—		
Joe Rubin, Henderson 1	¶	1285
Chase & Co., Mutchler 5	¶	835
MEDINA COUNTY—		
Edson & Son, Miller 29	15	480
Miller 30	12	477
Miller 31	15	475
Miller 32	15	480
Miller 33	5	473
Miller 34	*	418
O. K. O&G Co., McVickers 40	8	494
PERRY COUNTY—		
John Walsmith & Co., Sam Redfern 3	¶	1148
STARK COUNTY—		
East Ohio Gas Co., J. C. Mayer 1	¶	4518
W. G. Miller 1	¶	4465

NORTHWESTERN OHIO

SANDUSKY COUNTY—		
Michael Wagner & Co., Fee 1	*	....
WYANDOT COUNTY—		
Keiner & Co., Hoffman 1	30	1417

KENTUCKY

DAVIESS COUNTY—		
Hupp, Duff & Co., Atherton 4	20	....
Daly & Daly, Mitchell 1	*	....
McLEAN COUNTY—		
W. W. Dameron & Co., Morris 9	135	....
OHIO COUNTY—		
Chenault & Co., P. R. Kelley 3	*	800
Vickers & Co., Doc Royal 1	*	500
H. L. Ogle & Co., A. Cooper 1	25	800
T. M. & J. M. Meredith, E. Fuqua 6	25	....
Snowden-McSweeney, H. L. Odell 1	*	700
J. H. Haynes, Ellis Himes 3	*	525

*Failures; †Junked; ¶Million cu. ft. gas.

Drilling Reports On Important Wildcats

OKLAHOMA

ATOKA COUNTY—Malernee et al's Greenville National Bank 1, nw sw 36-2s-13e, dr 1700 ft.

BECKHAM COUNTY—West Oak Gas Co. et al's Powell 1, nw nw sw 11-9n-25w, Dolomite 3426-3488 ft, est 15M cu ft gas sso and wtr, Dolomite 3547-3549 ft, gas increased to 18M cu ft, td 3550 ft, to pb and shut off wtr.

CADDO COUNTY—Denver P. & R. Co.'s Noe 1, nw sw sw 34-10n-10w, pulling tubing to drill deeper.

CARTER COUNTY—Hudson and Poland's Sullivan, ne se 5-5s-1w (formerly The Texas Co.'s) rig and tools. Geo. Pace et al's M. Jack 1, ne nw nw 10-4s-2w, lcn.

CLEVELAND COUNTY—Phillips Petroleum Co. et al's Community-Baker 1, cse nw 11-9n-2w, dr 1415 ft.

COAL COUNTY—Westheimer & Daube's Lowman 1, cne se 18-2n-8e, sd 4862 ft. Moore & Deaner's Edwards 1, nw ne se 27-2n-8e, lower Wapanucka 4403 ft, Caney 4725 ft. Brookshire et al's Rowland 1, nw ne ne 18-3s-10e, cas on ground and repairing rig to deepen.

COMANCHE COUNTY — Miller-Goodnight Drlg. Co.'s Welderman 1, nw se se nw 34-2n-12w, dr 300 ft. F. F. Stevens' Green 1, se sw 2-1n-13w, dr 805 ft, Honey Creek. Heiden-Taylor's Crutcher 2, cne 11-1n-12w, dr 1195 ft.

COTTON COUNTY—Ben Russell's Fowler 1, (formerly Zumbuemn 1) se nw 21-4s-12w, rur.

HUGHES COUNTY—Scruggs et al's Black 1, nec 13-9n-10e, Dolomite 3918-3922 ft, Wilcox 3922-3929 ft sw, sd for orders. Burk-Kan's Gardner 1, ne ne nw 22-6n-9e, to abandon. J. B. Hill et al's Perkins 1A, cw¼ sw sw 7-5n-9e, ur 6 in cas 1050 ft.

LEFLORE COUNTY—East Oklahoma O&G Co.'s Metcalf 1, swc 2-4n-26e, dr 1400 ft.

LINCOLN COUNTY — Anderson-Kerr's Huckabee 1, swc 9-15n-2e, td 5381 ft, wtr, D&A. The Texas Co.'s Gessman 1, se ne 33-14n-4e, dr 2254 ft. H. W. Pierce's McMurtry 1, nec 6-14n-5e, Mayes 4250 ft, Woodford 4485 ft, Hunton 4518 ft, Sylvan 4594 ft, Viola 4676 ft, Dense 4709 ft, Dolomite 4718 ft, Wilcox 4735-4740 ft, td, hfw, D&A. Mid-Continental Oil Co.'s Bolby 1, cse sw 27-12n-2e, rig.

LOGAN COUNTY—W. N. Anthony's Fruin-Eckman 1, se sw 4-16n-1e, rur.

McCLAIN COUNTY—Carter Oil Co. et al's Hanner 1, sw ne sw 24-5n-1w, topped Woodford 5923 ft, Hunton 6030 ft, dr 6180 ft in Hunton, no show. Denver P. & R. Co.'s Newborn 1, cse sw 22-5n-1e, base red bed 2440 ft, dr 3270 ft.

MURRAY COUNTY—T. E. Revells et al's Wolfe 1, nec 18-1n-2e, dr 2240 ft, conglomerate. Gilcrease Oil Co.'s Brown 1, swc 26-1n-2e, dr 1260 ft.

NOBLE COUNTY—The Texas Co. et al's Voss 1, sw ne se 28-22n-2w, Tonkawa 3163 ft, dr 3420 ft. Continental Oil Co et al's Bennett 1, se nw 19-20n-1w, Oread 2730 ft, Perry gas sand 3502 ft, dr 3525 ft in sand.

OKLAHOMA COUNTY—Gypsy Oil Co. et al's Community Grant 1, cse nw 27-13n-4w, dr 4745 ft. Springrose Drilling Co.'s Edwards 1, cse se 19-11n-1e, cored in Hunton 6155-6161 ft, Green shale 6282 ft, td 6285 ft, bailing.

OSAGE COUNTY—Empire Oil and Refining Co.'s 1, se ne 3-25n-3e, dr 2115 ft in sand, hfw. Peters Petroleum Co. and Norbla O&G Co.'s 1, swc 15-25n-5e, dr 1205 ft. Norbla O&G Co.'s 1, nw se 31-24n-7e, cellar.

PAWNEE COUNTY—Geo. Thomas' School land 1, swc 13-20n-5e, co.

PITTSBURG COUNTY—Stencil Oil Co. et al's Chunn 1, se se nw 29-4n-14e, set surface pipe, wocs.

PONTOTOC COUNTY — Riddle et al's Barnes 1, se nw se 21-5n-4e, 12 in cas 93 ft, wocs. Bayle et al's Newbern 1, sw ne 31-5n-4e, dr 1390 ft. Emanuel, Rudman & Natcher's Mayer 1, csw se nw 7-3n-8e, Atoka 1010 ft, Gilcrease 1040 ft sg, sand 1090 ft, dr in sand 1160 ft, hfw. Dandridge et als' Stafford 1, nwc 5-1n-6e, rng 10 in cas 623 ft. Paul R. Robb's Vittetoe, (owdd) cne se 11-5s-4e, dr 4855 ft in shale.

SEMINOLE COUNTY—Harmon Oil Co.'s Bowlegs 1, se ne sw 1-7n-7e, fsh cas. Tate and Starbuck's Heard 1A, se nw 9-6n-7e, dr 620 ft.

STEPHENS COUNTY—Geo. Pace et al's Siever 1, se sw 4-1n-7w, td 3302 ft, sd.

ABBREVIATIONS

NOTE—The following is the explanation of abbreviations, signs, etc., used in completion and wildcat reports: *—dry hole, abandoned well; ‡—salt water; †—junked and abandoned; ¶—million feet of gas; abn—abandoned; bbls.—barrels; b.s.—basic sediment; cas—casing; co—cleaning out; dk—derrick; dr—drilling; fsh—fishing; ft—feet; in.—inches; lcn—location; m—milling; n, s, e, w—north, south, east, west; r—reaming; sd—shut down; sdtr—sidetracking; sp — spudding; sr — straight reaming; std—standardizing; sw — salt water; td—total depth; ur—underreaming; wo—workover; woc—waiting for cement to set; wosr—waiting on standard rig.

KANSAS

BARTON COUNTY — National Refining Co.'s Ingersoll 1, cnw ne 2-19s-13w, dr 1520 ft. Walter Shearan et al's Kimpler 1, se ne ne 31-18s-11w, sd 300 ft. C. L. Price et al's Erlich 1, nw se 10-16s-13w, lcn.

BUTLER COUNTY—L. C. Hay et al's Bolin 1A, se sw se 36-26s-6e, td 2176 ft. Tom Palmer and Darby Petroleum Co.'s Harder 1, nw se nw 27-24s-3e, ur 6 in cas 3053 ft, td.

CLAY COUNTY—Seidel Bron's Glace 1, ne sw 21-9s-4e, ru. Seevers et al's Myers 1, ne nw nw 4-10s-4e, td 1872 ft wtr, D&A.

DICKINSON COUNTY — Dutch Oil Co.'s Phillips 1, cne nw 15-15s-1e, sd 1356 ft.

FINNEY COUNTY—National Refining Co. et al's Smith 1, cse sw 2-23s-29w, td 1800 ft, ur 8 in cas.

GREENWOOD COUNTY—B. Taylor et al's Wilson 1, se ne se 5-28s-10e, mach.

HARPER COUNTY—Wood Brothers' Anthony 1, csw sw 17-31s-9w, sd.

HARVEY COUNTY—Lassen-Bruce et al's Joseph 1, nw ne 13-24s-2e, spd and sd. Wentz et al's Schrag 1, nw se 24-22s-3w, rig.

KINGMAN COUNTY—Kessler et al's Bollinger 1, sw nw sw 12-28s-5w, dr 120 ft.

LYON COUNTY — Arkman and Baker's Hind 1A, ne nw 30-21s-12e, dr 1075 ft.

McPHERSON COUNTY — Continental Oil Co. et al's Graber 1, ne nw 34-21s-1w, dr 2889 ft, 2932-2936 ft sg, increases at 2942 ft and 2950-2955 ft, est. 3M cu ft gas, 2960 ft td. Slick, Pryor and Lockhart's Ordineal 1, se sw se 21-20s-3w, Wilcox 3757 ft, cored to 3772 ft td, no show D&A. Tom Palmer's Nordling 1, se sw 19-18s-2w, hfw 2425 ft, 8 in cas 2580 ft, dr 2630 ft. Marileen O&G Co. and Goering Brothers' Decker 1, nw se 21-18s-1w, rig.

OSAGE COUNTY—Jim Edwards' Detrich 1, cnw se 21-14s-15e, mach.

OSBORNE COUNTY — Carmen and Hershey's Fritz 1, cne ne 9-10s-14w, spd and sd.

PHILLIPS COUNTY—Ashby et al's Close 1, cse 24-5s-18w, sd 3420 ft.

RENO COUNTY—Sinclair Prairie Oil Co.'s Shepherd 1, se nw 22-26s-9w, ru. L. H. Wentz's Milcalf 1, se ne sw 3-24s-7w, sd 495 ft. Foraker et al's Hiett 1, se sw ne 34-24s-4w, dig pits. Atlantic Oil Producing Co.'s Phillips 1, ce¼ nw ne 22-22s-6w, fsh tools 2759 ft td.

RICE COUNTY—Langston et al's Markle 1, ne ne sw 1-20s-9w, co 1186 ft td. Aylward, Trees et al's Belder 1, sw se ne 27-20s-7w, dr 1875 ft. George Dickey et al's Hunter 1, nec 35-19s-7w, Siliceous 3710-3765 ft td, hfw, D&A. Reserve Development Co.'s Heinz 1, ne sw se 8-18s-10w, topped Lansing 2918 ft, rng 8 in cas, td 2943 ft. Continental Oil Co., Empire Oil and Refining Co. and Shell Petroleum Corp.'s Bennett 1, cse ne 25-18s-8w, td 3135 ft, sd to run cas.

ROOKS COUNTY—Phillips Petroleum Co.'s Dopita 1, csw sw 31-8s-17w, dr 3283 ft.

RUSH COUNTY—Central States Light and Power Co.'s Basgall 1, sec 10-17s-16w, lcn.

RUSSELL COUNTY—Western Exploration Co.'s Andrea 1, swc 30-15s-12w, dr plug and had wtr, D&A, corrected td 3387 ft.

SEDGWICK COUNTY—Sovereign Oil Co.'s Nichols 1, cnw se 20-25s-1w, dr by 12 in cas 675 ft, td.

STAFFORD COUNTY—Vickers Petroleum Co. and Phillips Petroleum Co.'s Cravens 1, sw ne 15-25s-11w, average five day pump test 182 bbls oil and 263 bbls wtr, comp. Stanolind O&G Co.'s Denkler 1, sw nw sw 10-22s-12w, ru.

SUMNER COUNTY—Morgan and Flynn's Mercer 1, nw ne nw 36-32s-1w, dr 840 ft.

TREGO COUNTY—Alma Petroleum Co. et al's Thodes Estate 1, csw sw 14-11s-23w, topped Oswald 3552 ft, 8 in cas 3558 ft, so in core at 3565 ft, rust 3593 ft td.

WOODSON COUNTY—Sheedy et al's Street 1, ne se nw 28-24s-14e, dr 1825 ft.

EAST TEXAS

ANDERSON COUNTY—Byrd-Frost, Inc., and Stanolind's Alice Scott-Pure 1, (300-ac) Jas. Crawford sur, Slocum area, elev 398 ft, Pecan chalk 4379-4852 ft, Austin chalk 5281-5435 ft; pb from Woodbine sand 5455-5501 ft, showing salt water with trace oil, to re-drill upper sand. Guy Jameson, C. W. Byron, W. C. McGlothlin et al's S. N. Price 1, (60¼-ac), J. J. Y'Barbo sur, Springfield-Blackfoot area, elev 512 ft, Pecan chalk 3114-3298 ft; Austin chalk 4292-4610 ft, dr 4700 ft.

ANDERSON COUNTY (Cayuga Area)—Barnsdall Oil Co.'s J. D. Loper 1 (40-ac) dk; W. L. Tubbs 1 (40-ac), elev 322 ft, Pecan chalk 2260-2552 ft; Austin chalk 3230-3549 ft and top Woodbine section 3881 ft, coring 3900 ft. Hill & Hill, Inc. and Turman Oil Co.'s K. E. Curtis 1 (205-ac), B. Kimbrough sur, lcn. Roeser-Pendleton, Inc.'s V. Bowyer 1 (200-ac), rig. J. R. Meeker et al's H. H. Duncan 1 (12½-ac), A. Enes sur, elev 355 ft, Pecan chalk 2350-2447 ft and top hard Austin chalk 3392 ft, dr 3650 ft. Tide Water and Texas Seaboard's J. N. Eden 2 (992.75-ac), elev 280 ft, top Pecan 2146 ft, dr 2250 ft; Wills 2 (832.29-ac), elev 324 ft, Pecan chalk 2228-2395 ft, Austin chalk 3167-3595 ft and oil sand 4069-89 ft; pb from salt water at 4113 ft to 4089 ft; Wills 40, rig; Wills 5, lcn; E. L. Harton 1 (106.48-ac), elev 315 ft, rig; G. T. Robertson 1 (50.4-ac), lcn.

CASS COUNTY—J. D. Kneen et al's E. M. Ball 1 (160-ac) Cass Co. School Lands, sp and sd. Remley-Nelley & R. Kamon Group No. 1's Mrs. I. O. Savage 1 (121-ac), Mary Patterson sur, elev 351 ft, Pecan chalk 2030-2488 ft and shut down in Georgetown lime 3625-3805 ft. H. F. Wilcox et al's S. A. Orr 1 (316-ac), G. W. Morris sur, elev 381 ft, cem cas 3836 ft, sd to std at 3887 ft. United Production Corp.'s T. J. Walton 1, J. Coleman sur, dr 500 ft.

CHEROKEE COUNTY—A. R. Lewis et al's Jess Bradford 1 (50-ac), John Laprelle sur, sd 2835 ft. W. L. Stearns et al's W. L. Stearns 1 (89-ac), S. A. Maverick sur, Boggy Creek field, lcn. T. J. Wood & Young's New Birmingham Dev. Co. 1 (160-ac), Levi Jordan sur, elev 432 ft, Pecan chalk 3985-4306 ft, Austin chalk 4840-4978 ft and top of Woodbine series 5012 ft and sd for test with oil stained sand at 5130-5139 ft.

FREESTONE COUNTY—Walter L. Goldston et al's E. M. & C. H. Watson 1, R. D. Price sur, lcn. Clyde Creighton et al's W. A. Holley 1 (80-ac), A. B. & M. sur, elev 399 ft, sd 5124 ft. J. E. Milburn et al's J. P. Fulton 1 (40-ac), J. P. Fulton sur, lcn. Trinity Farm Securities Co. and A. A. Lander's Trinity Farm 1 (80-ac), R. M. Williamson sur, lcn.

FRANKLIN COUNTY—Magnolia Pet. Co.'s J. M. Dupree 1 (640-ac), W. D. Taliaferro sur, lcn.

HENDERSON COUNTY—John R. Black, Darby, Stanolind et al's G. B. Meredith 1 (109-

ac), Wiley Kay sur, elev 373 ft, Pecan chalk 2323-2457 ft, Austin chalk 3350-3757 ft, testing sand, probably salty 4109 ft. Big Bad Wolf Oil Co. (Frank S. Morris's) E. E. McCrary 1 (50-ac), Wm. H. Irwin sur, lcn. Great State Oil Corp.'s R. Sid Ansley 1, N. B. Thompson sur, dk. Gulf Prod. Co.'s Geo. M. Collins 1 (100-ac), Wm. J. L. Scott sur, rig.

HUNT COUNTY—M O. Shawver et al's J. H. Jones 1 (99-ac), Lydia Ferguson sur, Austin chalk 1180-2035 ft, dr 2910 ft. J. H. Waggoner O&G Co. and L. G. Priest's J. R. Love 1, (95-ac), John Grilisky sur, elev 558 ft, top Pecan chalk 1562 ft, Austin chalk 1928-2040 ft, dr lime 3340 ft.

KAUFMAN COUNTY—Garvin Germany et al's W. S. Kirby 1 (6-ac), S. Edens sur, sp and sd.

LAMAR COUNTY—Cole-Waggoner et al's W. B. Martin 1 (132-ac), J. Deck sur, sd 2500 ft.

LIMESTONE COUNTY — C. M. "Dad" Joiner et al's S. A. Knapp 1 (676¼-ac), Luke Moore sur, near Kosse, sd 1700 ft.

MORRIS COUNTY—Ginsberg Bros. et al's E. Hall 1 (177-ac), Levi Jordan sur, dr 150 ft. C. L. Simpson, Ralph A. Porter and W. Z. Beasley's P. M. Staggers 1, J. D. Nelson sur, sd 2330 ft.

NAVARRO COUNTY—W. J. Keeling et al's J. F. Rushing 1 (84-ac), Henry Ford sur, dk. L. N. McCulloch et al's C. D. & J. L. Berry 1 (35-ac), W. W. Moss sur, dr 310 ft.

RAINS COUNTY—J. W. Halsell et al's T. F. Jones 1 (22-ac), BBB&C Ry. sur, elev 425 ft, top Nacatoch sand 1610 ft, sd 1635 ft.

RUSK COUNTY—G. A. Hathaway et al's Gray 1, Jas. McLain Sur, elev 315 ft, top Georgetown lime 3140 ft, sd 4460 ft. Geo. F. Hudson et al's Jeff H. Phillips 1-A, N. Villareal sur, top Pecan chalk 2412 ft, dr 3160 ft.

SMITH COUNTY—Cochran and Williams' Mrs. J. M. Dean 1 (100-ac), B. Moore sur, lcn. B. F. Phillips et al (was M. M. Rowan's) Gibbons Mfg. Co. 1, J. M. Garcia sur, elev 304 ft, sd 3830 ft. Preston Rose et al's E. Wiggins 1, H. K. Day sur, rig. Texas Trading Co.'s O. T. Ray 1 (100-ac), M. T. Duncan sur, northeast of chandler, elev 367 ft, Pecan chalk 3118-3280 ft, Austin chalk topped at 4334 ft, coring lower Woodbine section 5110 ft.

UPSHUR COUNTY—G. H. O. Oil Co.'s J. M. Floyd 1 (177-ac), Robt. Raiford sur, sd 1085 ft. Lanmier & Moore (was Mrs. Vaughn's) M. A. Vaughn 1 (108-ac), P. B. Standifer sur, n of Big Sandy spd and sd. Joe Papadakis et al's L. V. Towery 1 (4-ac), Wilson L. Parmer sur, rig. R. S. Randerson et al's J. H. Minor 1, R. D. Cannon sur, 3 mi ne of Coffeeville, Pecan chalk 2300-2860 ft, top broken Austin chalk 3510 ft and first hard chalk 3530 ft, dr 3600 ft.

VAN ZANDT COUNTY—B. F. Blackman et al's C. E. Dorrill 1 (35-ac), C. E. Rivers sur, sp and sd. C. A. Gilliam, Virgil Whitworth and Arthur Allen's A. T. Bass 1 (16-ac), Wm. Hart sur, sd 4236 ft. Griffith Bros. et al's Bruce-Gibbard 1-A (134-ac), G. Martinez sur, skid rig. W. E. McKinney et al's V. T. Davis 1-A (3.66-ac), testing 1166 ft. S. E. Miller Co.'s J. M. Palmer 1 (59-ac), sp and sd. Peden-Olson Oil Co.'s W. S. Brannon 3 (45-ac), lcn. Skinner et al's D. F. Cade 1 (28-ac), sd 240 ft. Van Zandt Synd.'s Dr. C. S. Coker 1 (60-ac), testing 1208 ft. J. D. Wrather et al's G. W. Carter 1-A (10-ac), elev 477 ft, Pecan chalk 2007-2057 ft, Austin chalk 2510-2735 ft, testing Woodbine sand 2880-2948 ft.

WOOD COUNTY—D. T. Cauble & Mrs. J. C. Thompson's N. G. Bobbett 1-A (50-ac), Daniel Fuller sur, Mineola area, elev 497 ft, Pecan chalk 2950-3234 ft, Austin chalk topped 4965 ft, dr 5420 ft. McElreath-Suggett Oil Corp.'s B. D. Holley 1 (43.2-ac), Thos. M. Moore sur, Pecan chalk 2630-2742 ft, dr 3600 ft. Alex M. Snyder et al's J. T. Holmes 1 (122-ac), A. N. McKnight sur, lcn.

SOUTH TEXAS

BASTROP COUNTY—Marts & Beavens' J. D. King 1, Enoch Harris Sur No. 22, dr 2000 ft; A. Reyes 8, A. Litton Sur, lcn. Watt L. Saunder's, Tr.'s A. Harris et al 1, J. Maximillian Sur, Blk 436, 2338 ft, run 4 in cas. Three Oil Corp.'s M. Ingram 1, H. S. Morgan Sur, dr abt 700 ft.

BEE COUNTY—Caeser Oil Co.'s Pullin Est. 1, F. Lewis Sur, prep to sp; W. E. Ruckman 1, F. Lewis Sur, ru; R. E. Miller 2, F. Lewis Sur, sp. Dash Prod. Co.'s Ruhman 1, Lot 14, Wm. Hodge Sur, lcn. Dirks Bros.' Skinner & Harris 1, Sec. 10 Ragley Sub, J. M. Uranga Gr, dr 2530 ft. Heep Oil Corp.'s J. C. Wood 1, P. Crain Sur, td 4708 ft, pb snd 4200-33 ft, to comp as gasser. J. L. Tippett (formerly W. P. McLain et al) Laura Weiss 1 (was 2), 685 ft e No. 1, B&B Sur, re-dr 100 ft. Phillips Pet. Co.'s T. P. Morgan 1, H. E. Eyles Sur, td 6091 ft, comp fsh job, prep to run electric test. United Prod. Co.'s G. A. Ray 45, W. J. Porter Sur, coring 3821 ft.

BEXAR COUNTY — Dingman & Russell's Mrs. C. N. Cassin 1, F. Rodriguez Sur, dr 200 ft. McPhee & Briggs, Florence Lamb 1, M. de Luna Sur, sd 315 ft; R. Carter, same Sur, lcn. Eckert & Son, Mrs. J. Stanfield 1, Montaya Sur No. 75, dr 750 ft. Joe Beckly Fee 1, San Antonio townsite Sur, dr 1255 ft. A. M. Blume's L. Ridder 2, J. M. Baerrera Sur No. 58, td 1630 ft, test fresh water, pb 1600 ft. George O'Neill et al's G. F. Niemann 1, Juan Montez Sur No. 6, bail 1425 ft. C. A. Smith's H. J. Lamm 1, Jose de la Garza Gr, sd 982 ft.

CALDWELL COUNTY—H. M. Anderson et al's W. B. Perry 1, Gideon Pace Sur, ru and sd. S. S. Cargill's Damerau 2, D. Cooper Sur, fsh 2262 ft. Bob Keene et al's W. Ewald 1, J. George Sur, dr 2228 ft. Joe Mills et al's E. Johnson 1, J. Pinchback Sur, treat with acid 2110 ft, small oil show, sd.

CALHOUN COUNTY—Continental Oil Co.'s Am. Nat'l Realty Co. 1, ne Sec. 6, Blk C, ru. Southwest Oil Corp.'s E. H. Welder 1, Cuadrilla Irr Sur No. 8, dr 6009 ft; Welder 2, Day Land & Cattle Co. Sur A 228, sur cas set 915 ft.

CAMERON COUNTY—C. J. Webster O&G Co.'s Laguna Vista 1, center Blk 238, Isabel Gr, dk up, wor.

DE WITT COUNTY — Keystone Royalty Co.'s L. T. Burns 1, N. McNutt Sur, dr 200 ft, lack of water. Slick-Urschel's Poetter 4, 3170 ft swl and 330 ft sel 591 ac tr, ru.

FRIO COUNTY — Amerada Pet. Corp.'s Halff & Oppenheimer 2, J. H. Gibson Sur No. 16, dr 3800 ft.

GILLESPIE COUNTY—Ed L. Nixon's Lindig 3, J. Guerra Sur No. 41, clean out 150 ft.

GOLIAD COUNTY—Jim Kendrick's Runge Nat'l Bank 1, 330 ft nl and el n½ 142-ac tr, 4500 ft e prod, pits dug, move in rig. J. W. O'Byrne's Runge Nat'l Bank 1, s½ 142-ac tr, making lcn. Sun Oil Co., making lcn in vicinity North Pettus field.

GUADALUPE COUNTY—Hoderfield et al's Reed 1, A. P. Corbin tr, Wm. Hunter Sur No. 32, dr 2032 ft. Adolph Seideman's Seideman 1, A. M. Esnaurrizer Sur. No. 11, dr 2856 ft, hard schist.

DUVAL COUNTY—A. C. Bess's A. Parr et ux 1, AB&M Sur No. 131, dr 3275 ft. Buffalo-Texas Drlg. Synd., Inc.'s T. V. De Saenz Escobar 1, San Francisco Sur, Share 6, sd 2386 ft. S. B. Cloyes & W. P. Luse's Hagist 1, Blk 11, Sec 265, td 2400 ft, twist off ds, fsh. J. W. O'Byrne's Juan Benavides 1, e E. Cole field, contract for 3500-foot test. Sun Oil Co.'s Moreno 1, Sec 540, dr 2250 ft. J. D. Clair Smith's W. P. Notron 1, nw s sw Sec. 62, prep to sp. J. R. B. Moore's W. R. Peters 1, 330 ft n and 1644 ft wl Sec. 36, ru. G. G. Mortimer et al's W. R. Peters 1-B, 330 ft n and w sw¼ Sec. 196, sp in. Russ Pet. Co.'s Cantrell 1, 330 ft n and e l ne nw Sec. 61, dr 1950 ft.

HIDALGO COUNTY—Davis & Harrison's Mrs. L. George 1, Tr. 13, Por. 41, dr 1000 ft. Union Sulphur Co.'s ARGL&I Co. 1, Lot 2297, Blk. 59, N. Capisallo Dist., dr 5630 ft. Woods et al's John Lawrence 1, Tr. 274, Por. 39, dr 1050 ft.

JACKSON COUNTY — Encino O&G Co.'s Drummond 1, 466 ft n and e l tr, lcn; State Realty & Inv. Co. 1, 466 ft sl and 1000 ft el Vanderbilt townsite, lcn; Simon & Seidel 1, ne offset discovery well, Vanderbilt, set sur cas 1100 ft. Humble's Toney 1, just s discovery well, survey lcn. Mid-Continent Pet. Corp.'s Seidel & Simon 1, 466 ft s and w l of tr, making lcn. Turnbull & Erwin's T. N. Barrow 1, 466 ft ne and se l tr, lcn.

JIM WELLS COUNTY—Andrews & Long (Plymouth) Cuero Cattle Co. 1, HT&B Sur. No. 9, ru. John F. Camp's B. W. Owens 1, Sec. 11, dr abt 1000 ft. Roger Putnam & W. H. Bode's S. McCarley 1, Casa Blanca Gr, dr 2880 ft.

KARNES COUNTY — Houston Oil Co.'s Niehaus 1-B, Talley Sur, snd 3631-35 ft, show oil and gas on dst, set cas, woc. S. W. Forrester's M. Ruckman 1, Musquiz Sur, sp. Magnolia's Scarborough 1, re-instate to dd, now gasser 3639 ft. G. A. Ray's Mrs. S. E. Radford 1, M. Nichols Sur, sd 3910 ft.

KERR COUNTY — Edmiston & Walker's Whitworth 1, Sec. 1439, dr 175 ft. G. F. Schreiner's Jeff Love 3, Sec. 1594, ru. Jeff Love & Eastland Oil Co.'s Jeff Love 5, Sec. 1591, sp.

LEE COUNTY—James E. Pederson's C. A. Turner 1, David Hudson Sur, r 1905 ft. Twin S. Oil Co.'s Robert Otts 1, Thos, Morros Sur, sd 1497 ft, snd.

LIVE OAK COUNTY — Holmes & Goodwin's Fee 1, B. Haugherty Sur, blew out 890 ft, flow gas and sw. Jane Oil Co.'s H. L. Lark 2, Blk 2, E. W. B. Scrugham Sur, snd 988-91 ft, cas set 987 ft, woc. C. R. Kennon's Lark 1, Blk 27, bail 1070 ft. Loma Oil Co.'s L. Jacob 26-A, W. H. Jacob Sur. No. 25, snd 1049-73 ft, completing; 27-A, 660 ft n and 660 ft w No. 26-A, prep to move on. Ike W. Taylor et al's Griffith 2, 660 ft n No. 1, prep to sp. Smith & Parsons' V. I. Gomillion 2, 2000 ft s Witherspoon gasser, J. B. Ammons Sur, dr 525 ft.

McMULLEN COUNTY—C. A. Hall's H. L. Lark 2, replacement hole for Lark 1, E. W. B. Scrugham Sur, dr 855 ft. C. R. Kennon, Tr.'s Lark 2, 175 ft n and w l e½ Blk 15, dr 350 ft. Lefevre & Spice's E. R. Hagist 2, H&TC Sur, Sec. 17, Cole snd 1227-52 ft, show little oil, dd. Loma Oil Co.'s L. Jacob 102, Benham Sur, lcn. Sheldon et al's Jacob Corp. 1, ½ mi w Jacob prod, survey lcn. C. C. Shumway, Inc.'s, Shiner Ranch 6, 2310 ft nl and 330 ft el Sec. 62, sp. Light Stephenson's H. L. Lark 1, Blk 15, snd 1021-49 ft, liner filled with shale, cleaning out. Texio Oil Corp.'s Jacob Corp. 3, Benham Sur, snd 910-38 ft, completing.

MEDINA COUNTY—Scoggins & Sanders' L. W. Burrell 1, M. E. Gage Sur No. 395, dr 1081 ft, very hard brown lime.

NUECES COUNTY—Diadem Oil Co.'s J. C. Mayo 1, Sec. 23, Geo. H. Powell Sub, Driscoll Ranch, comp fsh job 4307 ft, re-dr. Nutex Oil Co.'s King 1, Sec. 24, Richard King Farm Lots, td 6021 ft, wait on orders. Petrol Corp.'s Vincent Bluntzer Est. 1, J. V. L. de Herrera Sur, dr 3750 ft. Sullivan-Texon Royalty Co.'s Simmons & Perry 1, Puencitas Gr 8, dr 4945 ft. Texas Seaboard Oil Co.'s Laurel Farms 1, Sec. 40, J. O. Chapman ranch, ru. United Prod. Co.'s C. P. Talbert 2, W. R. Peters Sub, Lot 9, Sec. 4, dr 4995 ft.

REAL COUNTY—H. J. Heartwell's M. S. Perry 1, sw Sec. 175, AB&M Sur, dr 1600 ft.

REFUGIO COUNTY—C. B. Bunte's F. B. Rooke 2, Blk 8, Anton de la Vina Sur, dr 4150 ft; Rooke 3, Anton de la Vina Sur, dr 4480 ft. J. W. Heard & Holland Oil Co.'s Peck 1, Sec. 24, Bonnie View Ranch, dr 4875 ft. G. Jeffrey's J. F. Power 1, J. Garza & J. Vidauri Sur, dr 2050 ft, last rept. Nesral & Baymore's V. E. Heard 1 (2), Ximines Sur, ru. Tivoli O&G Co.'s G. W. Bissett 1, John Crockett Sur, dr 4900 ft.

SAN PATRICIO COUNTY — Beasley & Maxwell's Saddler 1, Sec. 32, T. Perez Sur, 4th sub Taft Farm Lots, dr 1950 ft. C. B. Bunte, Inc.'s, C. C. Smith 1, A. Armstrong Sur, dr 3150 ft. Circle W. Oil Co.'s (Josey Oil Co.) E. H. Welder 1, Tr. 5, E. Villareal Sur, dr 4750 ft. Heep Oil Corp.'s Welder 1, 2½ mi nw Plymouth well, lcn; Bob Welder 1, on Bob Welder home tr, n city limits Sinton, lcn. Plymouth Oil Co.'s Welder 2-A, 1320 ft due e No. 1-A, J. & F. Portillo Sur, ru; Welder 1-B, same sur, 3500 ft nw 1-A, lcn.

STARR COUNTY — Andrus & Borah's A. Guerra 1, San Jose Gr, Sh 6, sd 310 ft. Hewitt & Dean Bros.' M. M. Garcia 1, Sec. 918, re-dr 245 ft. Goodwin & Yantis' Kelsey Bass 4-A, Blk 4, Por. 86-87, td 685 ft, prep to dr in; Kelsey Bass 5, Blk 10, Por. 86-87, lcn. Great Plains Oil Co.'s Sanchez 1, Sec. 344, dr 3900 ft. Merle Gunby's Block Bros. 1, 622 ft el and 350 ft nl, Blk 13, 4500-ac sub, ru. W. P. McDonald et al's E. A. Peffley 1, Sec. 933, dr 2100 ft; C. C. Bowman 1, Blk 13, Sec. 888, dr 2900 ft. Los Olmos O&G Co.'s Kelsey Bass 59, Sec. 7 Por. 75-76-77, dr 640 ft. Smithtex Oil Co.'s

Starr Co. Cattle Co. 1, Blk 20, Por. 88-89, td 2474 ft, cas set 2438 ft, dr out plugs; Starr County Cattle Co. 2, just e No. 1, making lcn. Garfield Buell's El Puerto Ranch 1, center share 4, Sur. 10, lcn. Sun Oil Co.'s Guerra 7-B, Las Cuevitas Sur, coring sh and shells 2102 ft; M. Guerra 6-C, Sacatosa Sur, ru. E. L. Younkin's Kelsey Bass 2, Por. 86, bldg dk; Starr County Cattle Co. 1-A, Blk 62, Por. 89, td 2665 ft, lay water line.

TRAVIS COUNTY—Humble's Eppwright 1, 450 ft nwl and 150 ft swl 50 ac tr in C. Barket Sur, dk.

UVALDE COUNTY—Humble's R. L. Anderson 1, J. J. Guerra Sur, prep to set sur cas 480 ft. T. T. Word's Truelove 1-A, Elam Sur, dr 420 ft.

VICTORIA COUNTY—C&RG Drlg. Co.'s R. C. Roos 1, M. A. Castanon Sur, re-dr 4577 ft. Humble's Mitchell 1, P. Benavides Sur, set 55 ft 20 in cas, woc; O'Conner 14, Keating Sur, dr 3079 ft. Petrol Corp.'s John Machelec 1, R. Manchola Gr, gas snd 2172-88 ft, dr 2550 ft. Texas Co.'s A. M. McFadden 2, C. M. B. Hoyt Sur, re-in to dd 2025 ft.

WEBB COUNTY—Usher Carson's A. Webster 2-D, nw sw ne Sec. 684, snd 3039-47 ft, td 3048 ft, woc. J. W. Edwards' M. Vela 1, Blk 9, Sec. 267, coring 1904 ft. United Prod. Co.'s Bruni Est. 1, Sec. 8, Blk 42, Adams sub, Arispe Gr, coring 2927 ft.

WILLIAMSON COUNTY — Fritz Fuch's Henry Sladek 1, H. White Sur, snd and sh with oil 549-56 ft, set cas on packer to test. Taylor Ref. Co.'s Reiger 3-A, H. White Sur, td 930 ft in serp., re-cement cas.

WILSON COUNTY—A. P. George Fee 1, Cantu Diaz Sur, sd 976 ft, gumbo, to rep pump.

ZAPATA COUNTY—H. B. & W. Oil Co.'s J. C. Cuellar 1, Blk 3, Sec. 2, Pappas Sub, Porcion 34, dr 1100 ft. O. W. Killam's M. Guerra 32-A, Cerrito Blanco Gr, dr 2533 ft. R. B. Morrison's Los Burros Ranch 1, Blk 4, Por. 19, dr 875 ft. Joe C. Palmer's S. Vela 1, Share 4, El Guello Sur, Blk 170, ru. C. C. Crew's M. D. Slator 1, Blk 1, Borrego Gr, sd 1739 ft. Texas Co.'s Whitehead 46, Cerrito Blanco Gr, dr 1175 ft. United N. & S. Dev. Co.'s N. Guerra & Son 1, 6182 ft nel and 1822 ft nwl, Por. 55, dr 1200 ft.

TEXAS GULF COAST

AUSTIN COUNTY—Sun Oil Co.'s Zetik 1, S. M. Williams Sur, near Brenham, dr sh 1903 ft.

BRAZORIA COUNTY—Holt et al's Griffith 1, 3 mi e of E. Columbia, J. B. Bailey Sur, rigging up. W. H. McCarthy's Nat'l Life Ins. Co. 1, 330 ft out of w corner of Tr. 3, Mohler Subd. H. Austin sur, lcn. Shell Pet. Corp.'s Howry 2, HT&B Sur, coring oil snd 6212 ft.

BRAZOS COUNTY—H. L. Bleam's Harrison 1, near Curtain, Allacorre Sur, lcn.

BURLESON COUNTY — Southern Seaboard's Coulter 1, 9400 ft from sw line, 2200 ft from nw line of 1176 ac tr, A. Kennon Sur, se corner of county, lcn.

CHAMBERS COUNTY—John H. Carreker's Weaver 1, 3 mi e of prod., A. Weaver Sur, sd 2180 ft.

FT. BEND COUNTY—H. M. Naylor's Gehr 4, Kennedy Sur, sd 5466 ft.

GALVESTON COUNTY — G. K. Spoor's Stewart 1, approx. 3 mi n of Hitchcock, W. K. Wilson Sur, coring ahead at 4175 ft. Humble Oil & Refining Co.'s Maco Stewart 1, J. Sellers League, center of e and w 400 ac tr. s of s bank of Dickinson Bayou, lcn.

GRIMES COUNTY — W. D. Roan et al's Kelly 1, near Carlos, U. Sanders Sur, lcn.

HARDIN COUNTY — Resourse Oil Co.'s Sternberg O&R Co. 1, ne of Kountz, abn lcn. Pharr et al's Bernard 1, ¼ mile of prod. in the Sour Lake field, H&TB 69 Sur, preparing to rewash. Wilcox Oil & Gas Co.'s Sternberg 1, 1328 ft from ns line and 1311 ft from we lines of G. Dorsey Sur. Danciger O&R Co.'s Hooks 2, flank of Batson dome, W. Donahue Sur, plugged back to 4760 ft. Frazier & Greer's Sternberg Lbr. Co. 1, 2 mi nw Kountz, H&TB 283 Sur, abn at 6988 ft.

HARRIS COUNTY—W. F. Armstrong et al's Turner 1, approx. 4 mi w Aldine, W. C. R. R. Sur, lcn. C. C. Foster et al's Johnson 1, approx. 2000 ft from s line and center of ew line of CC&SF Sur, n of Baytown, lcn. Imperator Oil Co.'s Brooks 1, 7400 ft s and w of ne corner of R. R. Vine Sur, dk.

JASPER COUNTY—Louis Franklin's Cartwright 1, ne Spurger area, E. Legrand Sur, moving in material.

JEFFERSON COUNTY — Sun Oil Co.'s Long 1, 2½ mi sw Nome, John Blair Sur, reaming at 7138 ft.

LIBERTY COUNTY — Gulf Prod. Co.'s Kirby C-2, 4 mi se Cleveland, J. Pleasant Sur, fsh for core barrel lost about 4800 ft; Kirby C-4, 3306 ft n, along w line of J. Pleasant Sur, from ne corner of J. Eddridge Sur, and 1700 ft e at right angle, at 1700 ft w of discovery well, rigging up. H. Sample's Security Trust Co. 1, 6 mi w little n toward Cleveland, J. Faulk Sur, coring ahead below 4660 ft. G. S. Thomas et al's Eicke 1, 4 mi n Liberty, Green Sur, sd 5030 ft.

MADISON COUNTY—Hall Edward's Flucher 1, F. Flucher Sur, dk; Peters 1, dr black sh 6212 ft.

MATAGORDA COUNTY—Dr. Griffith's Fee 1, w Markham, W. E. Bell Sur, rigging up.

MONTGOMERY COUNTY—Baker et al's Benker 1, 2 mi nw Conroe townsite, L. H. M. Washington Sur, circulating mud at 4670 ft. Humble O&R Co.'s Texas Long Leaf Lbr. Co. 1, n Steen's well, Walker County School Land Sur, dr 3583 ft. McElory Oil Co.'s Grogan 1, approx. 6 mi nw Goodwin, P. V. Hamblin Sur, dr sn 4906 ft. Steen Drilling Co.'s Tex. Long Leaf Lbr. Co. 1, 8 mi e Conroe field, Walker School Land Sur, coring ahead below 5937 ft.

NACOGDOCHES COUNTY—Dick Schwab's Ramlin 1, 15 mi ne Nacogdoches, J. Simpson Sur, abn at 4920 ft.

ORANGE COUNTY—Texas Louisiana Oil Co.'s Moore 1, 5 mi n Orange, Ben Johnson Sur, sd 3706 ft.

POLK COUNTY — Howard Dailey et al's Knox 1, 1½ mi ne Corrigan, F. Chairs Sur, lcn.

TYLER COUNTY — Boon Wallace Lane's Crews 1, S. L. Graham Sur, lcn.

WALLER COUNTY—Amerada Pet. Corp.'s & Stanolind O&G Co.'s Mary Manor 1, near Harris County line, H&TB RR. Sur, topped Hockeylensis at 5385 ft.

WHARTON COUNTY—Pure Oil Co.'s Lancaster 2, washing and resetting screen; Stewart 2, dr sh 7564 ft.

LOUISIANA GULF COAST

ACADIA PARISH—Superior Oil Co.'s J. S. Arceneaux 1, 28-8s-3e, moving in rig; Leo Kahn 1, 35-8s-3e, moving in rig; E. Mire 1, 33-8s-3e, moving in rig; Richard Lovenskie 1, 34-8s-3e, moving in rig. Woodley Pet. Co.'s Daigle 1, 27-7s-1e, dk.

BEAUREGARD PARISH — Humble O&R Co.'s Long-Bell 1, 11-5s-7w, sh 9335 ft. F. W. Martin's Cochran 1, 34-4n-12w, sd 4038 ft.

CALCASIEU PARISH—Trio Oil Co.'s Grey 1, 33-9s-12w, dr sh 2575 ft.

CAMERON PARISH—Texas Co.'s Calcasieu Lake 1, 1-14s-9w, rigging up.

JEFFERSON DAVIS PARISH—Shell Pet. Corp.'s Kratzer 1, 12-9s-4w, preparing to drill plugs, well flowing 50 bbls per hour through 18/64-inch choke from 8682 ft. Tide Water Oil Co.'s Aimea Bourgeois 1, six mi w Welch field, Section 28-9s-5w, dr sn 840 ft.

ST. MARTINS PARISH—The Texas Co.'s St. Martin Ld. Co. 6, 17-8s-7e, dr 5245 ft.

ST. LANDRY PARISH—Superior Oil Co.'s U. T. Iseringhousen 1, 35-8s-3e, moving in rig; Marcellos Savoil 1, 27-8s-3e, moving in rig.

NORTH LOUISIANA

BIENVILLE PARISH—Hibeltha Oil Co.'s Woodward 1, nw nw 26-15n-9w, dr 50 ft.

BOSSIER PARISH—John L. Anderson, Tr's Leonard 1, sw sw 19-19n-13w, core 3216 ft. Howard & Bird's Sam Gold 1, nw ne 36-20n-13w, mov in rig. Producers O. & G. Co., Inc.'s W. H. Werner 1, se se 7-17n-11w, mov in heavier rig to deepen from 3211 ft.

CADDO PARISH—W. T. Bell et al's Bostick 1, SW SW Section 12-22n-16w, claim oil show at 2460 ft wo cas. J. T. Humphrey et al's J. C. Powell 1, nw se 14-19n-15w, claim gas blowout in 2 ft sand 2382-84 ft arr set 6⅝ cas at 2370 ft. A. D. King, Tr's Roach 1, 4-14n-16w, sd 2128 ft. R. W. Norton's French B-1, nw nw 34-23n-16w, arr perf cas 5600-5900 ft.

CALDWELL PARISH—Terrell & Price's La. Central Lbr. Co. 1, nw ne 18-11n-3e, sd 2355 ft.

CLAIBORNE PARISH—United Gas Pub. Serv. Co.'s Carter Unit 1, 32-20n-5w, dr 2870 ft.

DE SOTO PARISH—L. H. Alderman's P. B. Peak 1, nw ne 25-11n-13w, treated with acid in chalk at 1762 ft. S. J. Barber's Horton 1, sw sw 4-11n-11w, dr 2735 ft. R. E. Collins' A. M. Thigpen 1, nw ne 29-15n-12w, dr 1850 ft. Jack Dempsey & Bobby Manziel's Thigpen 1, sw ne 33-13n-13w, dr 1535 ft. George Le Grand's D. T. Fulmer 1, nw sw 1-11n-16w, dr 800 ft. E. T. Oakes' Johnson 1, ne nw 30-13n-15w, sd 5094 ft. J. S. Tuffree's McGill et al 1, sw se 1-10n-13w, dr 2120 ft.

NATCHITOCHES PARISH—Penn Southern Pet Co. et al's Chopin Lbr. Co. 1, ne sw 4-5n-5w, dr 2100 ft. Plummer & McDaniels' Lizzie Walmsley 1, se sw 45-10n-8w, rigging up. J. B. Storey, Tr's W. W. Page 1, se nw 18-8n-9w, dr 1470 ft.

OUACHITA PARISH—S. C. Wilson & Fred Mitchell's W. L. Williams 1, sw se 5-16n-1e, plugged back to 2763 ft from 3480 ft claim 18 inches sand blg to test.

RED RIVER PARISH—A. D. Mytilen's La. Delta Pecan 1, sw sw 27-13n-11w, tested sw 802 ft w. o.

SABINE PARISH—D. D. Alexander's H. T. Brown Est. 1, sw sw 9-9n-11w, dr 3460 ft. R. L. Gay, Tr's Long-Bell A-1, nw nw 10-8n-13w, arr plug back to 4757 ft. M. J. Kissick's Barr 1, sw se 6-4n-12w, dr 2970 ft. Tex-La-Ark Oil Co.'s Pickering Lbr. Co. 1, 3-3n-12w, sd 1585 ft.

ARKANSAS

HEMPSTEAD COUNTY—A. G. Bagnell et al's Rheinhart 1, sw sw 2-13s-26w, sd 1290 ft.

LAFAYETTE COUNTY—Douglas Lawn's Camp 1, sw se 14-15-25, dr 1412 ft. C. V. Lenz' L. A. Foster 1, ne se 9-15-25, dr 2110 ft.

LITTLE RIVER COUNTY—M. E. Sanderson's Hale 1, se se 22-12s-32w, dr 2005 ft.

MILLER COUNTY—Duluth-Arkansas Oil Co.'s Beck 2, se sw 34-15-26, sand at 2809 ft wo. King Oil Corp.'s C. H. Schroder 1, sw ne 24-14-28, ds recovered wo 1920 ft. C. E. Murdock's Beck 1, se se 33-15-26, testing td 2929 ft. Frank Roe's Olivet 1, ne se 4-16-26, dr 2940 ft. Texarkana Oil Corp.'s H. E. Beck 1, sw sw 34-15-26, swabbing td 2920 ft. Lee Timberlake' E. L. Beck 1, nw se 33-15-26, dr 1355 ft. J. K. Wadley's Deckerman 1, sw nw 24-17-27, dr 3945 ft. E. L. Young's R. M. Patterson 1, se ne 5-19-28, co arr to make ds test td 3666 ft.

UNION COUNTY — E. R. Henderson's Ogden 1, 32-18-14, used acid, td 2208 ft.

MISSISSIPPI

AMITE COUNTY — Mineral Resources, Inc.'s Anderson 1, ne nw 14-3n-3e, arr res at 550 ft.

FRANKLIN COUNTY — E. R. Ratcliff's Homochitto Lbr. Co. 1, se se 20-5n-2e, top of Vicksburg 2220 ft dr 2221 ft.

GREENE COUNTY — United Gas Pub. Serv. Co.'s Davis 1, nw nw 30-1n-5w, dr 6215 ft.

ISSAQUENA COUNTY—Pelican Oil & Gasoline Co.'s Steel Bayou Corp. 1, sw nw 14-12n-8w, 10-in. cas 206 ft.

MADISON COUNTY—H. A. Wilson, Tr's Cepek 1, sw ne 24-9n-3e, re-inforc dk arr res td 2300 ft.

NEWTON COUNTY—Dalton Dev. Co.'s Majure 2, 25-6n-11e, co td 3350 ft.

PEARL RIVER COUNTY—Gulf Ref. Co.'s May L. Williams 1, se ne 33-5s-17w, repr rig 3800 ft.

WALTHALL COUNTY—Mutual O. & G. Co.'s Boyd 1, sw sw 19-2n-10e, rig up.

ALABAMA

HOUSTON COUNTY—Rice O. & G. Co.'s Oakley Est 1, nw sw 9-3n-29e, cor sand 1159 ft.

TENNESSEE

HAYWOOD COUNTY—E. R. Henderson et al's Fee 1, rig (5 mi from Brownwood).

CALIFORNIA

KERN COUNTY

BUENA VISTA LAKE—Ohio Oil Co. K. C. L. 31-1, 31-31-26, td 7760 ft in shale showing little gas.

BUENA VISTA HILLS—E. C. Arnold No. 1, 34-31-24, loc.

COMANCHE POINT—Comanche Oil Co.'s 1, 15-32-29, sd 3387 ft. Metropolitan Dev. Co., Well 1, 23-32-29, rig.

DUFF AREA—Monterey Exploration Co.'s Duff 3, 15-30-29, td 3335 ft, plugged back to 3280 ft, flwg 310 bbls 24.1 gravity oil, cut 1%. Gilmore, Inc., Stuart-Gerard 1, 23-30-29, sd 2347 ft.

EDISON DISTRICT—Elyod Pet. Corp.'s No. 1, 19-30-30, td 1545, show of oil; may set csg soon.

LOST HILLS—Associated Oil Co.'s Williamson 1, 2-26-20, sd 7858 ft.

McKITTRICK—Shell Oil Co.'s Midway-Premier 1, 21-29-21, dr 4351 ft. Standard Oil Co.'s No. 45, 15-30-22, dr 2196 ft. Welport Oil Co.'s 105, td 1015 ft, testing shutoff.

N. SEMITROPIC—S. T. Alexander's Shields 1, 29-25-21, sd 1426 ft.

PIONEER ANTICLINE—Fisher & Welton's Harris, 35-11-23, set 8 in 320 ft.

TEMBLOR HILLS—Robert Foster's Well 1, 2-32-22, dr 462 ft.

UNION AVENUE—Alta Oil Corp.'s N-C 1, 6-30-28, co 6457 ft.

WHEELER RIDGE—Badger Oil Co.'s El Tejon 1, 31-11-19, co 5960 ft.

KINGS COUNTY

TULARE LAKE—Armadillo Gas Co.'s No. 1, 32-22-30, dr 1461 ft. Commonwealth Consolidated's No. 1, 21-22-20, co 1581 ft. Tulare Basin Gas Co.'s No. 2, 2-23-19, td 1208 ft, prep to cmt 4½ at 1190 ft.

AVENAL—Carl Weller's Baby King 2, 11-23-16, dr 892 ft.

MADERA COUNTY

DOS PALOS—Pure Oil Co.'s Chowchilla 1, 7-10-14, dr 1362 ft.

SAN JOAQUIN VALLEY

TRACY—Milham Explo, Co.'s Connolly 1, 5-4-5, dr hard shale 4319 ft.

SANTA BARBARA COUNTY

GOLETA—Hastain Stone, Simonds C-1, 9-4-29, dr shale 1750 ft.

LOMPOC—Lompoc Pet. Co.'s Beauterbaugh 2, 18-7-34, stuck drill pipe 2432 ft.

SANTA MARIA—Union Oil Co.'s Moretti 1, 24-10-34, loc.

SAN LUIS OBISPO COUNTY

CHOLAME—Willett Oil Assn., Jack 2, 10-25-15, rig.

VENTURA COUNTY

CONEJO—American Oil Co.'s Powell 1, 33-2-20, waiting on csg 3096 ft.

FILLMORE—Laing & Jacobs' Snodgrass 1, 32-4-19, sd 700 ft.

HOPPER CANYON—Hancock Oil Co.'s Hadley 5, 13-4-19, bailing and clg out 3357 ft. Oak Ridge Oil Co.'s Moran 3, 1-4-19, dr 815 ft.

LAS POSAS—Las Posas Pet. Co.'s Mahan 1, 22-3-20, dr hard sand 6393 ft.

OJAI—Garner Royalties Co.'s No. 1, Sec. 12-4-20, dr 1573 ft.

PIRU—Bolsa Chica Oil Corp.'s Snow 1-A, sd 2497 ft, plan to deepen. Piru Oil Co.'s Holser 1, 14-4-18, rig.

RINCON—Woodrow Pet. Corp.'s Woodrow 1, 4-3-24, redrlg 7615 ft.

SANTA PAULA—J. W. Mosher's No. 1, 22-4-21, dr 1925 ft.

SESPE—H. A. Ivers' No. 1, 1-4-20, dr 780 ft. Merchants Pet. Co.'s Cochran 4, 1-4-20, reamnig to 15½ in, td 1280 ft. Topa Topa Oil Co.'s No. 1, 35-5-19, rigging cble tools 3090 ft.

SIMI—American Drlg Co.'s No. 1, 6-2-17, dr 182 ft. Pomoc Oil Co. No. 1, 8-2-17, rigging rotary. Williamson & Danaker's No. 1, 36-3-18, dr 956 ft.

SULPHUR MOUNTAIN—Wm. A. Kirk's No. 5, 21-4-22, wtg on csg 1770 ft.

MISCELLANEOUS

FRESNO COUNTY, Cantua Creek—Western Guf Oil Co.'s S.P.L. 1, 15-17-15, dr hard shale 8630 ft.

DOS PALOS—Bergman Oil Co.'s Loma 1, 12-12-11, dr shale and sand 5816 ft.

MONTEREY COUNTY—Jas. M. Dougles No. 1, 36-22-9, dr 1873 ft.

SUTTER COUNTY—Buttes Oil Fields' No. 2, 35-16-1, dr 4320 ft.

YOLO COUNTY—Pacific Northern Gas & Oil Co.'s No. 1, 23-12-3, sd 6770 ft.

SOUTHERN CALIFORNIA

ARTESIA DISTRICT—Vanco Dev. Co.'s Millard 1, bldg rig.

ORANGE COUNTY—Spiek Oil Co.'s Derby 1, 9-6-10, td 748 ft, wtr shutoff o.k.

CARBON CANYON—Tehama Pet. Corp.'s Kramer 1, 33-2-8, testing wtr shutoff 1297 ft.

FULLERTON—Ohio Oil Co.'s Fullerton Hghts 1, 22-3-10, rigging rotary.

HUNTINGTON BEACH on the Tidelands—Black Eagle Oil Co.'s No. 1-B, permit 194, 32-5-11, td 3987 ft, redrlg at 1150 ft.

LOS NIETOS—Rex Anglin Dev. Co.'s Fallis 1, 30-2-11, sd 900 ft.

NEWHALL—B & L Drlg Co., B & L No. 1, 14-3-16, loc.

NEWPORT—Pioneer Drlg Co.'s Banning 2, 29-6-10, co 6452 ft.

NORTH LONG BEACH—Geo. L. Clayton's Co-operative 1, 31-3-12, sd 6550 ft.

PICO—Frontier Oil Co.'s No. 1, 12-3-12, stg cmtd 1460 ft.

PLACENTIA—Placentia Dev. Co.'s Verde 1, 35-3-9, td 4520 ft, redrlg at 2690 ft.

PUENTE—Signal Pet. Co.'s Rowland 1, 14-2-10, pumping wtr 4908 ft.

SAN FERNANDO—W. L. Alexander's No. 1, 7-2-14, sd 1300 ft.

SAN PEDRO—J. K. Wehrmann's No. 1, 14-5-14, sd 1642 ft.

SAUGUS—International Oil Co.'s Powell 1, 34-5-16, dr 760 ft.

WEST WHITTIER—Midfield Oil Co.'s Walker 1, 19-2-11, sd 4817, corrected depth.

MICHIGAN

MIDLAND COUNTY—J. P. McHugh's State Bank 1, Porter twp., nw nw nw sec 29, dr 600 ft. L. G. Thompson's Shirts 1, Greendale twp, sw ne sw sec 17, sd 2390 ft. Geo. Hanner's Hoyt 1, Jasper twp, ne ne ne sec 24, fsh 1125 ft. Jasmid Oil Corp.'s Pietscher 1, Jasper twp, se sw sw sec 28, dr 1650 ft. Greendale Lee Oil Co.'s Hitsman 1, Lee twp, nw nw sw sec 13, sd 2550 ft. Howard Patterson's Haskins 1, Ingersol twp, nw nw sw sec 26, sd 840 ft. W. J. Sovereign's Mode 1, Geneva twp, nw nw ne sec 25, lcn. Melvin & Brehm's Whitaker 1, Geneva twp, nw sw se sec 19, sd 1450 ft. McClanahan Oil Co.'s Oliver 1, se sw se sec 23, Porter twp, spud. McClanahan Oil Co.'s Converse 1, Greendale twp, se se nw sec 28, drv pipe 250 ft.

ISABELLA COUNTY—W. J. Bernier's Duncan 1, Vernon twp, ne sw sw sec 9, dr 3250 ft. McClanahan Oil Co.'s Hicks 1, Denver twp, sw nw sw sec 27, dr 650 ft. G. M. Obenauer's Diehl 1, Broomfield twp, se ne sec 15, dr 1250 ft. Youman & Burke's La Fever 1, Sherman twp, sw nw sec 2, drv pipe 250 ft.

OGEMAW COUNTY — McClanahan Oil Co.'s Guliford 1, West Branch twp, ne ne nw sec 29, sd 2800 ft. C. L. Hess' Fisk 1, West Branch twp, se sw sw sec 27, sd 2664 ft. McClanahan Oil Co.'s Boutell 1, Ogemaw twp, sw sw se sec 5, dr 550 ft. C. A. Perry's Wobing Heirs 1, Mills twp, sw sw ne sec 6, rigging up at 1695 ft, will make Dundee test.

CLARE COUNTY—McClanahan Oil Co.'s Frackelton 1, Lincoln twp, se se se sec 18, dr 1300 ft.

MECOSTA COUNTY—Hall-La Mee Syndicate's Oliver 1, Martiny twp, cne nw sec 13, lcn.

MONTCALM COUNTY—Daily Oil Co.'s Blair 1, Ferris twp, sw se se sec 11, bad hole 650 ft; Christensen 3, Home twp, sw sw se sec 3, dr 100 ft. Theodore Oil Co.'s Sherwin 1, Home twp, sw sw sw sec 13, bad hole 580 ft. Old Dutch Oil & Gas Co.'s Fowley 1, Belvadire twp, ne se ne sec 11, rig. W. J. Wilson's Robinson 1, Richland twp, ne nw sec 27, sd 475 ft.

IONIA COUNTY—Prairie Oil Development Co.'s Moss 1, North Plains twp, ne ne se sec 19, sd 2800 ft.

SAGINAW COUNTY—Chapin Oil & Gas Co.'s Sutlif 1, Chapin twp, ne ne ne sec 16, dr 625 ft. White Star Oil Co.'s State Bank 1, Birch Run twp, sw ne sw sec 26, sd. Crabon Oil Co.'s Berg 1, Birch Run twp, ne se ne sec 26, dr 800 ft.

EATON COUNTY—W. J. Bernier's Woodruth 1, Benton twp, sec 5, sd 2930 ft.

ST. CLAIR COUNTY—John Blake's McIntyre 1, Clyde twp, sec 1, sd 500 ft.

GLADWIN COUNTY—Atlas Drilling Co.'s Cronk 1, Gladwin twp, sec 23, sd 125 ft.

WAYNE COUNTY—Drake and Parson's Realth 1, Ecorse twp, sec 36, sd 1370 ft.

LAPEER COUNTY—W. C. Sowell's Kohler 1, Oregon twp, sec 4, dr 900 ft. Flynn Oil & Gas Co.'s Brankick 2, Oregon twp, sec 9, sd 525 ft.

SHIAWASSEE COUNTY—C. H. Ladd's Brooks 1, Caledona twp, sec 33, sd 2460 ft.

ALLEGAN COUNTY—Pure Oil Co.'s Beukema 1, Dorr twp, sec 27, dr 1950 ft.

MONTANA

FERGUS COUNTY—H. Rowland Clark et al's Woodward 1, Button Butte, sr to rerun 6⅝-in to 2699 ft for water shut off preparatory to test show of light oil in top of Devonian series at 2703 ft.

OREGON

PETROLEUM COUNTY—Oregon-Flatwillow Development Co.'s test dr 1611 ft with show of light oil in third Cat Creek sand.

WYOMING

CONVERSE COUNTY—E. B. Jones' State 1, sw sw sw 16-32n-69w, Shawnee Creek structure, mov in material. E. B. Jones' Pitman 1, dr 850 ft.

CARBON COUNTY—Earl W. Reader, Inc.'s Union Pacific 1, Overland Dome, dr 4490 ft, showing considerable oil.

SHERIDAN COUNTY—Sheridan Syndicate's Allison 1, Beaver Creek structure, rebuilding rig which was pulled in td 1260 ft (corrected depth).

ALBANY COUNTY—Ohio Oil Co.'s Chappel 1, dr 816 ft.

COLORADO

GRAND COUNTY—Interstate O&R Co.'s Linke 1, Dirt Creek district, sp 65 ft.

NEW MEXICO

BERNALILLO COUNTY—Norrins Realty Co.'s Elleana Gallegos 1, dk up.

RIO ARRIBA COUNTY—El Vado Structure Properties Co. has taken over Pan States Oil Co.'s Tierra Grant 1, ne 25-28n-2e, and resumed dr from 4100 ft.

SANTA FE COUNTY—Fisher & Wolcott's Hill 1, sw 6-10n-6e, Barton Dome, dr 1750 ft. R. E. Owens et al's Cantwell 1, nw ne 5-10n-9e, Cuerto Butte, running 12½-in to 426 ft.

BULLETINS

Air and Gas Lift Equipment

Chicago Pneumatic Tool Company, New York City, has issued a bulletin which describes its improved air and gas lift equipment, as well as other compressed air equipment for oil field use.

Arc Welding

The Lincoln Electric Company, Cleveland, Ohio, has published a handbook called "Procedure Handbook of Arc Welding Design and Practice" which is being offered at $1.50 per copy. It contains 434 pages and is bound with semi-flexible fabrikoid.

Welding Handbook

Lincoln Electric Company, Cleveland, Ohio, has issued a revised and enlarged edition of "Procedure Handbook of Arc Welding Design and Practice." The book was issued because the demand for the first issue had exhausted the supply. Orders for the book had been received from 25 foreign countries, as well as from every state in the union, according to the company. The new volume has been enlarged, containing over 450 pages.

Adjustment of Wages for Skilled Workers Approved

Washington.—Plans for adjustment of compensation of skilled oil workers so that they will "in effect receive a real income approximately equal in purchasing power to that of 1929" were given the approval of Oil Administrator Harold L. Ickes May 23.

The adjustment represents the establishment of minimum differentials between the wages provided for common labor in the oil code and those to be paid other employees under a scale worked out by the petroleum labor policy board on the basis of data submitted by representatives of the oil companies and oil operators and of labor.

Under the plan, the majority of skilled employees will get 80 percent of the 1929 weekly earnings, although they will work but 36 hours as compared with 48 and 56 hours five years ago. Other employees are to be paid on a graduated scale depending on the number of hours per week worked by them prior to the code and upon the character of their work, manual or clerical.

"From computations made by the Petroleum Labor Policy Board it is evident that the wage differentials will not impose any hardship on the industry," it was declared by the administrator. "This is well demonstrated by the fact that many companies are paying higher wages than the schedules will require, except on the Pacific Coast and in some sections of the Mid-Continent area."

Accompanying the announcement of the new plan was an order providing that after August 1, next, by which time the effect of the readjustment will have been given a fair trial, the administrator, on application, will consider the advisability of eliminating Section 4 of Article 2 of the code, so that thereafter employers and employees may be free to adjust differentials by mutual bargaining.

All remuneration due employees retroactively under the readjustment is to be paid on or before August 19, next.

Simultaneously with the approval of the readjustment order, the administrator announced that the question of definition of stripper wells and the application of the wage and hour provisions of the code to stripper well employees is being actively considered with a view to its disposition in the near future.

A brief statement by Judge Amos L. Beaty, chairman of the Planning and Coordination Committee, on May 24 disclosed that the plan for adjustment of wages was approved in the face of the committee's opposition.

"The petroleum administrator has adopted the recommendations of the Labor Policy Board on differentials for skilled labor," Beaty said. "The Planning and Coordination Committee has never agreed to but has consistently opposed these so-called differentials. We have simply been overruled by the administrator.

State Department Is Accused of Oil Trade

Washington, May 24.—Charges that the State Department, as far back as December, consummated a trade agreement with Colombia which may contain concessions on petroleum imports into this country, the details of which have never been made public, were made by Senator Hatfield of West Virginia, May 23, during debate on the pending tariff bill.

Under the measure, the President for three years would have authority to enter into trade agreements with other countries, in the making of which he could change the rates of duty on any commodity by not exceeding 50 percent.

Explaining that he was investigating the treaty, Senator Hatfield asserted "I have secured information as to its presumed contents, which information, if true, surely indicates that the treaty has not been negotiated with the intention on the part of the administration to increase employment opportunities of American workers or to benefit American farmers, but solely for the further enrichment of a few wealthy American concerns which possess valuable concessions in Colombia and which ship portions of their products to the United States.

"I have reason to believe," he continued, "that this so-called 'reciprocal trade treaty' between the United States and Colombia was made in order to protect American petroleum and American fruit interests with large holdings in Colombia from the payment of export taxes on petroleum and fruits which these interests ship into American markets, using low-paid foreign labor.

"We are today operating the petroleum industry of America under a code; we are permitting, through the government of the United States, only a certain percentage of well production, and in some instances one oil corporation in America is capable of producing daily a sufficient amount of oil for every purpose, for every consuming need.

"Further, is it not possible that Venezuela will demand and receive similar concessions from the United States for her oil and fruits, and that every other country will do likewise?"

Pointing out that under the bill the consent of the Senate is not necessary to any treaty, Hatfield pointed out that no protest by American oil interests would have any influence toward nullifying the agreement and that even the Senate could not nullify it.

Murray Modifies Ban On Capital City Drilling

Oklahoma City.—In a move which many were finding difficult to interpret, Governor William H. Murray, on Tuesday, May 22, relented on his former stand of no drilling within a mile radius of the state capitol building. The new order would permit drilling within a half-mile of the capitol but the governor apparently recognized city prohibitory ordinances since he specified that the new area should be, "opened for drilling for oil to any person or persons or corporation having authority to do so." The city government has relentlessly waged its battle against further extension of the drilling zone and it is doubtful that operators owning leases in the newly opened area will be able to drill.

The area is described as follows: That part of the one mile circle lying east of Kelly Street, excepting a "strip beginning on the north side of Twenty-third Street, 125 feet east of Kelly and running a line due north to a distance of 528 feet, thence due west to Kelly."

Why the governor retained this small tract in the restricted zone was not explained.

Chemical Well Treating Suit Dismissed

Suit of Dow Chemical versus the Chemical Process Company, filed in equity in the United States District Court at Muskogee, Oklahoma, and charging infringement, has been dismissed. The suit alleged an infringement of the Grebe & Sanford patent No. 1,877,504, owned by Dow Chemical Company.

Dismissal was agreed upon by the plaintiff. One of the defenses to the suit was that the patent sued upon was invalid. The case was expected to establish whether it is necessary to pay royalty under the patent involved when chemically treating wells. The dismissal was the result of showing non-infringement, and the validity of the patent was not passed upon.

Squeaks *from the* BULL WHEEL

"I hear you have been spreading reports that I am old enough to be your mother."

"How ridiculous. I merely remarked that I was young enough to be your daughter."

Fisherman (displaying a catch of magnificent size)—There; if I didn't have them, you'd a said I was a liar.

Friend—Well, you would a been."

"And just before they were to start marching down the aisle, the lights went out."

"Did they have the wedding anyway?"

"Oh, yes. They just walked down in the dark. That widow knows her way to the altar blindfolded by now."

A preacher, at the close of one of his sermons, said: "Let all who are paying their debts stand up." Instantly every man, woman and child, with one exception, rose. The preacher seated them, and said: "Now, every man not paying his debts, stand up." The exception noted, a careworn, hungry looking individual, clothed in last summer's suit, slowly assumed a perpendicular position.

"How is it, my friend," asked the minister, "that you are the only man not to meet his obligations?"

"I run a weekly newspaper," he meekly answered, "and the brethren who stood up are my subscribers, and—"

"Let us pray," exclaimed the minister.

The young mistress sent her maid, newly hired, for a number of toilet articles.

"Mandy," said the mistress a few days later, "where is that tar soap you got for me the other day?"

"Lawsee, miss," exclaimed Mandy, "what all's a blonde baby like you to do with tar soap? Ah thought you ordered it for mah own pussonal use."

"My wife is very irritable; the least thing sets her off."

"You're lucky at that, mine's a self-starter."

Preacher—I touched them rather deeply this morning, don't you think?

Deacon—I don't know. I haven't heard what the collection was.

"Did you enjoy your ride last evening with that young doctor?"

Elsie—"Indeed I did. He has a most charming roadside manner."

"Did you know that I had taken up story writing as a career?"

"No. Sold anything yet?"

"Yes; my watch, my saxophone and my overcoat."

Judge—Mose, is your wife dependent upon you?

Mose—She sho is, jedge. If I didn't go out and get de washin's she'd starve to death.

Doctor—To be quite candid with you, your trouble is just laziness.

Patient—Yes, doctor, I know; but what is a scientific name for it? I've got to report to my wife.

A Canadian business man, over on the other side, found that Englishmen, according to his notions, were rather difficult to thaw out. To one of them he said, "You British are a difficult crowd to deal with; you're so reserved."

The Englishman was surprised. "Oh, come," he said. "I don't think that's quite right. Why, when I was in the 'Eight' at Cambridge, I knew practically all the men in the crew except, perhaps, one or two, and they were right up in the bows."

"What is your idea of a gentleman farmer?"

"He's a person," answered Farmer Corntassel, "who is so well fixed that he can waste profanity on a golf ball instead of on a mule."

The following message was received by the son-in-law: "Your mother-in-law died. Shall we cremate or embalm?"

This was the answer: "Do both. Take no chances."

The aviation instructor, having delivered a lecture on parachute work, concluded:

"And if it doesn't open—well, gentlemen, that's what is known as 'jumping to a conclusion'."

A college professor in an Indiana town rushed into a grocery just around the corner from the building in which he taught and began: "Say, my wife gave me a list of groceries to bring home, but I forgot and left the list in my desk. I am in a great hurry; will you please start putting up the order while I go back after the list?"

"Say, Bill, how in thunder can one distinguish 'minute,' meaning 60 seconds, from 'minute,' meaning very small?"

"There's no visual way, Jim, but if you see 'minute steak' on the bill of fare you know how the adjective is pronounced when you get your order."

Joan had been rather a naughty girl nearly all the day. When her mother was putting her to bed at night, she said: "When you say your prayers, Joan, ask God to make you a good girl tomorrow."

With an inquiring glance up into her mother's face, Joan replied: "Why, what's on tomorrow?"

DIAMOND METAL INSERTS

No. 1 5/32 *No. 1 Special*

make the

Reaming Edge

of any Bit cut faster and hold up longer

DIAMOND METAL CO. INC.

DIAMOND

Mfgrs of Metallic Diamonds

HOUSTON, TEXAS, U.S.A.

Export Agents { OILFIELD EQUIPMENT CO., 30 Church St., New York City

Sole Maker
FENWICK-REDDAWAY
MFG. CO.
48 Paris St., Newark, N. J.
Stocks carried by
L. A. Rubber &
Asbestos Wks.
Los Angeles, Calif.
Nichols Transfer &
Storage Co.
Tulsa, Okla.
Open for Agencies.

OPERATIONS ENGINEERS INC.
Torsion Balance Surveys
SHELL BUILDING
HOUSTON FAIRFAX 0636

THE FORT WORTH LABORATORIES
Field Gas Testing. Analysis of oil field brines, gas, minerals and oil. Sell Thermometers, Hydrometers and Laboratory Glassware.
F. B. Porter, B.S., Ch. E., Pres.
R. H. Fash, B.S., Vice-President
828½ Monroe St., Ft. Worth, Tex.

INDEPENDENT EXPLORATION COMPANY
Seismograph Surveys
2210 Esperson Building
Houston Texas

PATENTS
Patents, Trade Marks, Copyrights and Infringement Litgation
HARDWAY & CATHEY
428-29-30 Bankers Mortgage Bldg.
Phone Fairfax 8232 Houston, Texas

HIRSCH, SUSMAN AND WESTHEIMER
ATTORNEYS AT LAW
32nd Floor Gulf Building
Houston, Texas
Specializing in Oil Law and Land Law

PATENTS
JESSE R. STONE
and LESTER B. CLARK
Patents, Infringment Litigation, Trade Marks
Associated with
Andrews, Kelley, Kurth & Campbell
2200 Gulf Bldg. Houston, Texas
Capitol 7245

SPECIALIZED

The OIL WEEKLY solicits and will accept subscriptions only from those who actually are engaged in production and transportation of oil and gas.

RESTRICTED

Advertisers' Index

J. S. Abercrombie
Abercrombie Pump Co.
Amerada Petroleum Corp.
American Askania Corp.
American Association of Petroleum Geologists
Alexander Anderson
American Iron & Machine Works ..... Back Cover
American Cable Co. .....Third Cover
American Roller Bearing Co.
American Steel & Wire Co.
American Well & Prospecting Co.
Axelson Manufacturing Co.

Baash-Ross Tool Co. 70
Baldwin-Duckworth Chain Corp.
Baker Oil Tools, Inc.
Baroid Sales Co.
The Barrett Co.
William M. Barret, Inc.
Biltmore Hotel
Boiler Specialty Co.
Bradford Motor Works
Brauer Machine & Supply Co.
The Brewster Co.
Bridgeport Machine Co.
Broderick & Bascom Rope Co.
Butler Manufacturing Co.
A. M. Byers Co.
Byron Jackson Co.

Cameron Iron Works
Carbolite Sales Co.
Carson Machine & Supply Co.
Caterpillar Tractor Co.
The Cavins Company
Chain Belt Co.
Chemical Process Corp.
Climax Engineering Co.
Columbian Steel Tank Co.
Continental Supply Co.
Fred E. Cooper Co.
Cooper-Bessemer Corp.
The Corbett Corp.
W. H. Curtin & Co.

Darling Valve & Mfg. Co.
E. M. Dart Mfg. Co.
Dayton Rubber Mfg. Co.
Detroit Graphite Co. 13
DeWitt operated Hotels
Diamond Metal Co. 81

H. John Eastman
Geo. H. Echols
Emsco Derrick & Equipment Co.

Fenwick-Reddaway Manufacturing Co. .. 82
First National Bank of Tulsa
Fluid Packed Pump Co.
Fort Worth Laboratories 82
Franklin Valveless Engine Co.
Frick-Reid Supply Corp.

The Garlock Packing Co.
Gas Lift Engineering Co.
Gaso Pump & Burner Mfg. Co.
Gearench Manufacturing Co.
General Electric Co. .....Second Cover
H. P. Gott Manufacturing Co.
B. F. Goodrich Rubber Co.
Gray Tool Co. 64
Gray Kerotest
The Guiberson Corp.
Gulf Publishing Co. 15-18
Gulf States Utilities Co.

Halliburton Oil Well Cementing Co.
Hardway & Cathey 82
Haynes Stellite Co.
Hazard Wire Rope Co.
C. M. Heeter & Sons Co.
Hercules Motors Corp.
Hirsch, Susman & Westheimer 82
Hughes Tool Co. .....Front Cover
Houston Oil Field Material Co.
Humble Oil & Refining Co.
Houston Ready-Cut House Co.
Hyatt Roller Bearing Co.

Independent Exploration Co. 82
Ingersoll-Rand Co.
International Cement Corp. 4
International Derrick & Equipment Co.
International Harvester Co.
International Nickel Co.
Byron Jackson Co.
Jareecki Manufacturing Co.
The Jeffery Manufacturing Co.
S. M. Jones Co.
Jones & Laughlin Steel Corp.

Kobe, Inc.

Larkin Packer Co. 69
Layne & Bowler Co.
The Layne-Wells Co.
Link Belt Co.
Ludlow Valve Manufacturing Co.
Lufkin Foundry & Machine Co.

Maloney Tank Mfg. Co.
Martin-Decker Corp.
F. G. Masquelette & Co.
Mayfair Hotel
J. H. McEvoy & Co.
McIntosh & Seymour Corp.
Mengden & Sons Co.
Geo. S. Mepham Co.
Merco Nordstrom Valve Co.
Miller Sand Pump Co.
Mission Manufacturing Co.
Lee C. Moore & Co.

National Bank of Tulsa
The National Supply Co.
National Tube Co.
Norma-Hoffman Bearings Corp.
Northrup Equipment Co.
Norvell-Wilder Supply Co. 21

Oil Center Tool Co. 66
Oil Equipment & Engineering Exposition
Oil Tool Manufacturing Co.
The Oil Well Improvements Co.
Oil Well Supply Co.
Oklahoma Gas & Electric Co.
Oklahoma Steel Castings Co.
Operation Engineers, Inc. 82
Osage Metal Co.

Pacific Pump Works 71
The Parkersburg Rig & Reel Co.
Patterson-Ballagh Corp.
Pelican Well Tool & Supply Co. 65
Pennsylvania Hotel
Petroleum Equipment Co.

Petroleum Iron Works
Petroleum Rectifying Co.
Piccadilly Hotel 74
Pittsburgh Equitable Meter Co.
Pittsburgh Steel Co.
Portable Rig Co.

Reed Roller Bit Co.
"Red Rex" Corp.
Regan Forge & Engineering Co.
Republic Steel Corp.
The Republic Rubber Co.
Rice Hotel
Ridge Tool Co.

Savoy-Plaza Hotel
Security Engineering Co.
Separafine Chemical Sales Co.
Shaffer Tool Works
Shell Union Oil Corp.
Sinclair Refining Co.
SKF Industries, Inc.
South Chester Tube Co.
Southern Pacific Lines
Southern States Co. 67
Howard Smith Co.
Nowery J. Smith Co.
Sonken-Galamba Corp.
E. M. Smith Co.
Spang & Co.
Sperry-Sun Well Surveying Co. 22
Stamm-Scheele, Inc.
State Bit Co. 62
Jesse R. Stone & Lester B. Clark 82
Stone Oil Tool Co.

Texas Rubber & Specialty Corp.
Texas Electric Service Co.
Texas Iron Works
Thermoid Rubber Co.
Transportation Equipment Co.
Trimont Manufacturing Co.
Tretolite Co.
Tulsa Camera Record Co.
Tulsa Oil Thief Co.
Tulsa Winch Mfg. Co.
Twin Disc Clutch Co.

United States Rubber Co.
Union Carbide & Carbon Corp.
Union Wire Rope Co.

The Vellumoid Co.
Waukesha Motor Co.
Western Pneumatic Co.
Wickwire-Spencer Steel Co.
Whitney Manufacturing Co.
Williamsport Wire Rope Co. 42
J. H. Williams & Co.
Wilson Supply Co. 16
Wyatt Metal & Boiler Works 59
Youngstown Sheet and Tube Co.

6 OUTSTANDING ADVANTAGES OF *Preformed* ROTARY LINES

Above are shown actual photographs of a length of ordinary rotary line and a length of TRU-LAY Preformed Rotary Line. The ends of both are *not seized*. What you see at the *ends* tells the entire story of what happens throughout the *entire rope length* when it is placed on the job. Wires and strands of the ordinary rotary line struggle desperately for release from the rope body—crippling its strength, limiting its efficiency and shortening its life. Wires and strands in TRU-LAY Preformed Rotary Lines lie *relaxed* within the rope body—preformed in manufacture to overcome this destructive Internal Stress. Hence TRU-LAY Preformed Rotary Lines have six outstanding advantages in the petroleum field over ordinary rotary lines.

1. TRU-LAY Preformed Rotary Lines do not have to be backtwisted to remove excessive twists.
2. Easier to thread through traveling block, crown block and eye in drum.
3. *Fastest* Rotary Lines in use today.
4. Less whipping at high speed, can be spooled faster and the idle block returned in less time.
5. Spool tightly under comparatively light weight of idle block.
6. Last longer, saving replacement costs, labor and shut-downs.

Write today for complete information on TRU-LAY Preformed Rotary Lines—how they eliminate internal friction, distribute load equally on all strands, resist kinking, cut without seizing, are easier to handle and easier to splice. Made in all standard sizes, constructions and lays. Makes "Lang-Lay" practical.

AMERICAN CABLE COMPANY, Inc.
WILKES-BARRE, PENNSYLVANIA
An Associate Company of the American Chain Company, Inc.

District Offices: Chicago, Denver, Detroit, New York, Philadelphia, Pittsburgh Houston, San Francisco

TRU·LAY *Preformed* ROTARY LINES

AMERICAN IRON & MACHINE WORKS CO.

H. M. (MIKE) MYRACLE
General Manager
Houston Plant

E. W. (ED.) HERRING
Warehouse and Office

ANNOUNCES... THE OPENING OF THEIR NEW PLANT IN HOUSTON, TEXAS

SO THAT WE MAY SERVE THE GULF COAST AREA BETTER WE HAVE OPENED A NEW MANUFACTURING PLANT, WAREHOUSE AND A SHOP EQUIPPED TO DO ALL KINDS OF OIL FIELD REPAIRING . . . WE INVITE YOU TO VISIT OUR PLANT AND TO CALL ON US FOR QUICK, DEPENDABLE SERVICE.

FRED RYALS
Office Manager

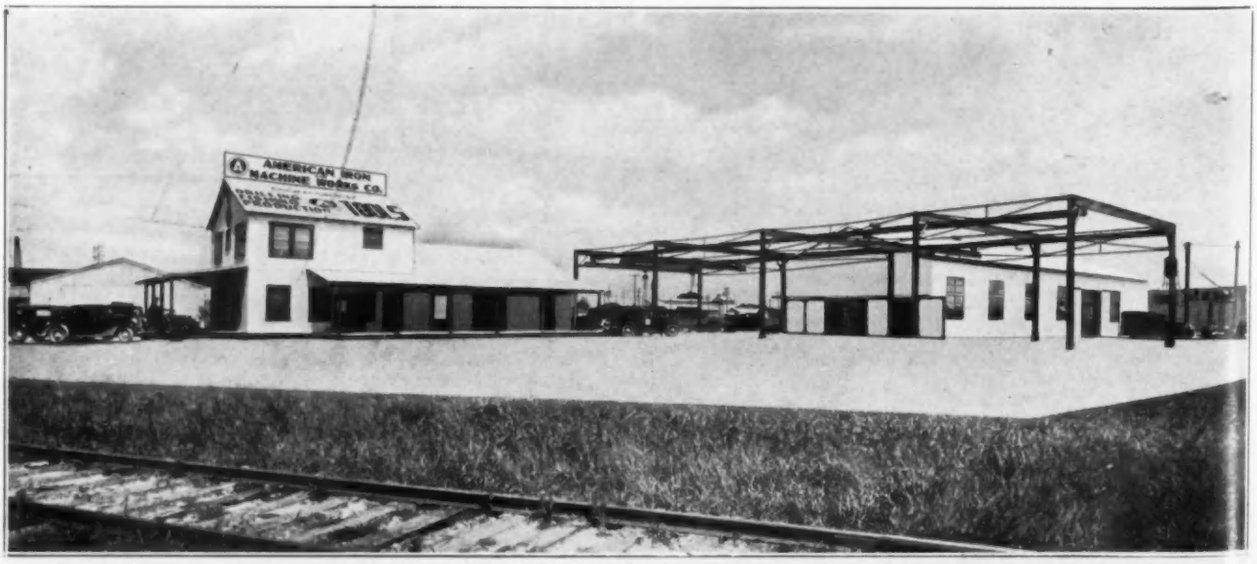
LEE HEWITT
Shop Superintendent

2205 Quitman Street

Phone Fairfax 6325

PAUL K. (P. K.) RIDGE
Representative
Southwest Texas

Below: Picture of Houston plant

GEORGE S. HINKLE
Representative
Southeast Texas and La.

T. F. (FLOYD) CRAINE
Representative
Houston Territory